The Journal

OF THE

AMERICAN ASSOCIATION OF NURSE ANESTHETISTS

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OPINION REVIEW

THE VALUE OF MEMBERSHIP IN THE A.N.A.

The place of nurse anesthetists in the American Nurses' Association has been a moot question since the organization of the American Association of Nurse Anesthetists in 1931 and the aborted attempt to affiliate the following year. The Structure Study of National Nursing Organizations and the adoption at the 1950 Biennial Nursing Convention of the "Two Part" plan for reorganization have caused a resurgence of interest in the possibilities of affiliation by some members of the A.A.N.A. In the report of the President at the annual meeting of the A.A.N.A. in Atlantic City, the opinion was expressed that the nurse anesthetists should "set their own house in order" before considering affiliation. In certain sections of the United States nurse anesthetists are more active in the American Nurses' Association than in others, and the Opinion Review *column seems a proper place for the different points of view to be aired.—Ed.*

The American Nurses' Association is to the nurse anesthetist as the American Medical Association is to the medical anesthesiologist. The medical anesthesiologists have their own anesthesia organizations, but primarily they are physicians. They go to local, state, and national medical meetings to keep in good standing as physicians. It is the same of physicians in obstetrics, urology, and the other specialties. They keep active in their original organization; their strength lies in numbers and unity. The American Medical Association knows the desires and aspirations of the medical anesthesiologists and backs them up in knowledge, legislation, and policies.

Another example is the public health nurse in the American Nurses' Association. The public health nurses have a strong organization of their own, but they have kept proper affiliation with the American Nurses' Association and have utilized that part of the program of the American Nurses' Association that is applicable to their specialty organization. The American Nurses' Association has faced the problem of accreditation of schools for nurses and in many areas has supported degree programs for nurses in colleges and universities. The public health nurses have taken advantage of this opportunity. It is true that the public health nurses get other help, but they profit from the experience of women who have given their lives to build the first national organization for the practicing nurse, the American Nurses' Association.

The National Organization for Public Health Nurses, with the backing of the American Nurses' Association, has become the strongest group of nurses in the United States. It has achieved more for its members than any other organization. Among these achievements may be mentioned high educational standards, retirement plans, improved

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In many hospitals we are required to show an American Nurses' Association registration card to hold a position. However, suppose we nurse anesthetists do try to get by with state registration, and the American Nurses' Association decides that all nurses who have been out of the organization for a specified time must take an examination to be reinstated in good standing. Anesthesia is strenuous, and as we grow older we may feel that we cannot continue in it and that we want to go back to the less strenuous field of nursing. However, if we are not interested enough to stay in the American Nurses' Association, I do not feel it should be too lenient or sympathetic with us.

There is strength in numbers. If we will keep our affiliations with the American Nurses' Association, it can be a source of help to us, and we can be a group of specialized nurses that they will be proud to claim as members. The American Nurses' Association is the second largest group of organized women in America. If we all work together, we can accomplish greater things for humanity and better things for ourselves.

Is it a secret why more young women do not choose nursing and anesthesia as a career? No. It is very clear. Life is a reality, and a person hesitates to give so much time preparing herself only to find at the end that she has qualified for long hours, overwork, and poor pay, no provision for the future when she is old, and in many cases not even Social Security.

An economic security plan for nurses is evolving and will provide for intervention for the nurse by her association in cases when perverse conditions exist in hospitals, or when a nurse is suddenly released without cause. If we had that help in our association, possibly we could avoid the so-called "drifting" of our anesthetists.

In the next two years we shall see much growth in the American Nurses' Association. The "Two Part" plan of structure for national nursing organizations is being formulated. Now is the time for nurse anesthetists to get into the American Nurses' Association and find their rightful place and go forward because of unity with a larger and stronger organization. We should keep our own anesthesia organization but utilize educational and other programs applicable to our organization.

In the "Two Part" program adopted by the American Nurses' Association one part will be formed and governed by nurses and the other will be composed of nurses and lay members. Nurses will be divided into sections: private duty, industrial, institutional, public health, and others, under which would come the nurse anesthetists. This part will be called the American Nurses' Association, and the other part will be the Nursing League of America. We should go to our state and district nurses meetings to see just how we may gain by remaining part of the American Nurses' Association.

It all adds up to the fact that we are still nurses although we are

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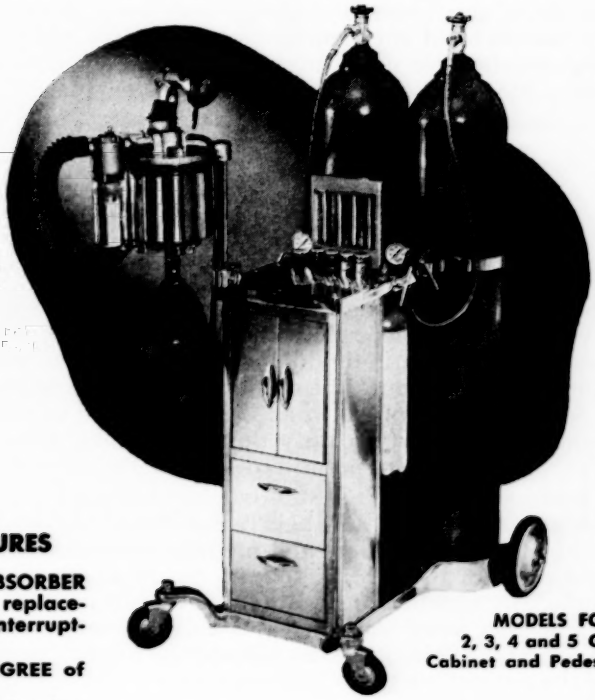

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in the specialty of anesthesia. Let us keep the American Association of Nurse Anesthetists by all means. But we will be much stronger by also settling in our rightful place in the American Nurses' Association if we do it in the right spirit. I see no reason why there should be any confusion about our plans and policies as nurse anesthetists. We are rightfully members of the American Nurses' Association, and a place in that organization for us as nurse anesthetists is a heritage earned by each of us.—MAUDIE YONCE, R.N., Jacksonville, Fla.

MORE ABOUT NIGHT CALL

The problem of accepting night calls by nurse anesthetists cannot be solved by a hard and fast rule, since much depends upon the circumstances existing in each individual situation: (a) the size of the hospital, (b) the number of hours the nurse anesthetist actually works during the day, (c) how much night work she is expected to take, (d) whether she is required to report on duty on the morning following the night call, or (e) whether she is permitted to take the next day off.

For many years nurse anesthetists have assumed the responsibility of furnishing night service in their department, because of the extreme shortage of nurse anesthetists and medical anesthesiologists. But, with the development of the field, it appears desirable that each hospital employ a sufficient number of anesthetists to carry the heavy burden of the day and also have someone available for night call, preferably a night anesthetist. This offers an advantage to the hospital, the physician, and the patient, as there is always an anesthetist within immediate reach when need occurs.

In many instances, however, where there is no night anesthetist and night calls are consistently heavy and frequent, night service works an actual hardship on the one on call. Obviously, there are numerous disadvantages to all concerned: overwork, long hours, loss of sleep, and slowed down reflexes result in a tired, nervous, overworked anesthetist who is required to assume a weighty responsibility during night emergencies.

In smaller institutions, where a call at night amounts to an occasional obstetric case, the anesthetist enjoys the freedom of leaving the premises to go about her personal business and merely leaves her telephone number where she may be reached. Consequently, she is always fit for work the following morning.

Of psychologic significance to the anesthetist is the system adopted by some hospitals, namely, a financial remuneration for each night call. Nevertheless, over and above that, the ideal solution of the problem lies in the employment of a night anesthetist, especially in the larger institution.—SISTER M. REGINELLA, R.N., Chicago, Ill.

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VOLUME XIX FEBRUARY, 1951 NUMBER ONE

NURSES HAVE NO CHOICE

War traditionally is a matter of healing as well as killing, of the relief of pain as well as its infliction. Soldiers bent on destroying other soldiers find by their sides nurses and physicians bent on saving soldiers from destruction. It hardly makes sense, but then war has never been one of the most reasonable of man's pursuits. On the other hand, a great deal of death and suffering during peacetime is not reasonable, viz., the accident room of any large city hospital on a Saturday night.

However, no matter what its cause—war, misfortune, neglect, negligence, or stupidity—or where it occurs, suffering has always been the call to action for nurses and physicians. The "where" and "why" are not questioned by those who have dedicated their lives to relieving pain.

Memories of experiences in the Armed Forces during World War II are not among the most pleasant for some nurse anesthetists who spent a good deal of time sitting on their hands while waiting for the military colossus to make proper use of their skills. Nor do those who remained at home recall with pleasure the exhaustion and frustration of trying to make two hands do the work of four.

The previous conflict is too close for there to be a new crop of enthusiastic youngsters ready to take on the adventures of the battlefield and station hospital. This time, in many instances, it will be the same old hands who, with no illusions, will fight mud, cold, and red tape to relieve suffering and save lives.

Even harder to bear this time will be the waiting, being prepared to do a job and for long stretches not having, and perhaps never having, that job to do. Keeping in mind the larger aim of preparations for war, peace, is not easy when one's assignment is to a post outside the fringes of conflict.

War, actually or potentially, is a national calamity, and it will be a credit to the whole profession if nurse anesthetists accept the call to the Armed Forces and the additional burdens at home with equanimity.

PROPHYLACTIC AND THERAPEUTIC USES OF VASOPRESSOR DRUGS IN ANESTHESIA*

Robert A. Hingson, M.D.,†
Anatalia Lopez, M.D., and
Rena Becker, M.D.
Baltimore

In 1897 J. J. Abel of the Johns Hopkins Hospital isolated epinephrine as the active principle and the short acting vasopressor substance from the suprarenal gland. Since 1900 more than 200 compounds that exhibit vasopressor activity have been synthesized and studied. The chosen few employed in therapeutics at the present time are, with few exceptions, related chemically to epinephrine. In general, the actions exhibited in the body by epinephrine resemble those obtained from stimulation of the sympathetic nerves: (1) a pronounced rise in both systolic and diastolic blood pressure to a peak that is proportional to the dose administered, (2) increase in heart rate, (3) dilatation of the coronary blood vessels, (4) constriction of the peripheral vascular bed, (5) decreased peristalsis, (6) dilatation of the pupil, (7) relaxation of bronchial muscles, (8) contraction of the splenic capsule.

In 1904 a slight alteration in the structural formula of epinephrine permitted Stolz of Germany to develop arterenol with twice the duration of pressor activity. In 1910 both synephrin and neosynephrin were developed as peripheral vasoconstrictors and as systemic vasopressors.

The combined pharmaceutic industries throughout the world are now supplying the medical profession with more than twenty-five standard vasopressors. However, the multiplicity of agents and the complex system of disguising agents under pharmaceutic trade names have increased confusion among both nurse and physician anesthetists concerning the proper evaluation of these various agents.

Consequently, it is the purpose of this article to classify the fifteen most commonly used vasopressors by structural formula, pressor activity, and duration of pressor activity and concomitant side effects, in such a manner that every anesthetist can determine promptly the appropriate agent and proper dosage as a prophylaxis against hypotension and as

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Read before the Seventeenth Annual Meeting of the American Association of Nurse Anesthetists, Atlantic City, September 21, 1950.

From the Departments of Obstetrics of the Johns Hopkins Hospital and University and Sinai Hospital.

*Made possible by grants to the obstetrical anesthesia research program of the Johns Hopkins University and Hospital from Abbott Laboratories, Astra Pharmaceutical Company, Ciba Pharmaceutical Products, Eli Lilly & Company, Merck & Company, Parke, Davis & Company, Sharp & Dohme, Inc., E. R. Squibb & Sons, Winthrop-Stearns, Inc., and Becton, Dickinson Company.

†Senior Surgeon, United States Public Health Service.

a temporary therapeusis in anesthesia emergencies.

Our compendium survey of the family of vasopressors is represented in the table.

The seven vasopressors introduced from 1897 through 1913 closely resemble the animal epinephrine in structural formula and in duration of action. These comprise the drugs of the pioneer period. From a careful scrutiny of the formulae we see that these seven compounds differ from one another only through the substitution or oxidation of two or three side chain atoms.

In America the modern era of vasopressors began with K. K. Chen's introduction of ephedrine as the active principle of the Chinese herb *Ma Huang* in 1923. Unquestionably, the correct use of this drug in hypotension associated with anesthesia has made possible the salvage of thousands of human lives. It is still the sheet anchor of all standard vasopressor therapy and is better understood by physicians and nurses than any other. It, like epinephrine, serves as a standard basis for comparison and appraisal of the newer agents.

This drug was studied and isolated by Chen while he was still a pharmacy student, preliminary to his medical education. Upon a return visit to China in 1921 Chen visited an uncle who was the proprietor of a Chinese herb store. He requested that his uncle supply him with the ten most potent poisons among his herbs. *Ma Huang* was selected for Chen as one of the lethal ten, and upon his return to his pharmacology laboratory he utilized extracts of *Ma Huang* in anesthetized dogs in surgical, anesthetic, and primary hemorrhagic shock. Significantly one of these extracts, ephedrine, restored animals near death to a nearly normal vascular status. With great thoroughness and meticulous accuracy in numerous publications and lectures Chen educated the American surgeon and anesthetist in the proper use of ephedrine, which had a duration of pressor activity seven to ten times that of epinephrine.

On the other side of the world Ogata of Japan in 1919 developed desoxyephedrine, which (see the table) is identical to ephedrine except that an oxygen atom has been removed from the first carbon in the side chain. This slight alteration in formula gives us a drug with twice to three times the potency of ephedrine and with ten to fifteen times the duration of pressor activity of epinephrine, or a 30 per cent prolongation of action over ephedrine. In spite of its efficiency it did not reach the western medical orbit until 1942, when it was introduced by Burroughs Wellcome & Co. as Methedrine, and later by the E. R. Squibb & Sons as Drinalfa and by the Abbott Laboratories as Desoxyn.

It may be seen from the table that the next six compounds more closely resemble the historic molecule ephedrine with the methylated side chains on one or both of the amine and terminal carbon atoms. The duration of pressor activity of all ranges from five to fifteen times that of epinephrine.

Within the very recent period five other vasopressors, as indicated in the last entries in the table, have been introduced, for

Vasopressor Drugs: Compendium Survey

Date of Discovery	Pioneer Investigator	Official Name	Pharmaceutic Trade Names						Activity of Epinephrine = 1		Dose mg.
									Pressor Activity	Duration of P.A.	
1897	Abel	Epinephrine	Epinephrine Adrenalin (Parke, Davis) Suprarenin (Winthrop-Stearns) Supranephrine (Rorer)	OH	OH	OH	H	CH_3	1	1	0.06-1
1904	Stolz	Arterenol		OH	OH	OH	H	H	1.5	2	0.5-5
1910	Bager & Dale	Neosynephrin	Neosynephrin (Winthrop-Stearns)	H	OH	OH	H	CH_3	0.2	2	0.5-5
1910	Bager & Dale	Synephrin		OH	H	OH	H	CH_3	0.01-0.04	4	0.5-5
1910	Bager & Dale	Tyramine	Tyrosamine	OH	H	H	H	H	0.01-0.05	2	20-60
1910	Bager & Dale	Phenylethylamine		H	H	H	H	H	0.005-0.0125	3-5	
1913	Alles	Paredrine	Paradrine (S.K.F.)	OH	H	H	CH_3	H	0.01-0.02	10-25	5-20
1919	Ogata	Desoxyephedrine	Methedrine (Burroughs Wellcome) Desoxyn (Abbott) Drinalfa (Squibb) Pervitin (S.K.F.) Desoxyfed (Breon)	H	H	H	CH_3	CH_3	0.01-0.02	10-15	5-20
1923	Chen	Ephedrine	Ephedrine	H	H	OH	CH_3	CH_3	0.005-0.01	7-15	20-50
1929	Chen	Propadrine	Propadrine (Sharp & Dohme)	H	H	OH	CH_3	H	0.003-0.017	7	16-48
1930	Piness, Miller, Alles	Amphetamine	Benzedrine (S.K.F.)	H	H	H	CH_3	H	0.002-0.01	5-10	5-30
1937	Rein	Paredrinol	Veritol (I.G. Farben)	OH	H	H	CH_3	CH_3	0.033	10	12
		Isoadrenalin	Cobefrin Corbasil	OH	OH	OH	H	CH_3	1	1	
		Methoxyamine	Vasoxyl (Burroughs Wellcome)	OCH_3	OCH_3	OH	CH_3	H	0.01-0.02	10-15	5-10
1940	Konzett	Isopropylarterenol	Aludrine (Lilly) Isuprel (Winthrop-Stearns) Isonorin (Carroll, Dunham, Smith)	OH	OH	OH	H	$CH(CH_3)_2$	Little	Pro longed relief in asthma	0.10-0.50

the most part within the last decade.

One of them, methoxyamine, or the Burroughs Wellcome & Co. Vasoxyl, has a pressor activity equal to or slightly greater than desoxyephedrine. On the same patient under controlled experiment we have used identical doses of ephedrine, desoxyephedrine, and Vasoxyl to find a pressor response and duration of activity to be in the reverse order. During the past fifteen years we have used all of the vasopressors almost daily in the conduct of some 12,000 conduction anesthesias. From this combined experience we believe that (1) epinephrine, (2) ephedrine, (3) neosynephrin, (4) desoxyephedrine, (5) methoxyamine, (6) isopropylarterenol, and (7) (2—methylaminoheptane) fulfil all the requirements of the sympatheticomimetic drugs singularly or in a dual combination.

INCOMPATIBILITIES OF VASOPRESSORS IN ANESTHESIA

The following incompatibilities exist in the use of the vasopressors:

Chloroform, trilene (trichlorethylene), and *cyclopropane*, because of the high frequency of cardiac irregularity with their use, through some direct pharmacologic cardiac muscle action, should not be used with the vasopressors.

Dripps, Kistler, and Ruben determined that intramuscular injection of Vasoxyl produces a prompt and prolonged rise in blood pressure without central stimulation and without causing cardiac irregularities even during cyclopropane anesthesia. This fact is of utmost importance in providing a safeguard not hitherto available in event of circulatory collapse under cyclopropane anesthesia. The fact that ephedrine and particularly desoxyephedrine so stimulate the sensorium that postanesthesia sleep may not be forthcoming without heavy sedation for four to eight hours after administration presents another advantage of Vasoxyl. Hypotension after general narcosis, moreover, responds more completely to the central nervous system stimulation of ephedrine and desoxyephedrine.

Nevertheless, we emphasize a guarded caution in the use of Vasoxyl and an absolute warning against using the other vasopressors preceding, during, or after cyclopropane anesthesia. Many publications in the past and many more anesthesia mortality commission studies have substantiated the incompatibility of most vasopressors, pituitrin because of its pitressin fraction, with cyclopropane, and now more recently with trilene. It is of utmost importance for the anesthetist to bear in mind the likelihood of auricular and even ventricular fibrillation when cyclopropane anesthesia is superimposed on or used concurrently with local or spinal anesthesia in which a vasopressor or a vasoconstrictor has been used. To test the validity of this adverse pharmacologic action in human beings, Adriani studied continuous electrocardiograms in dogs under spinal anesthesia in which epinephrine was incorporated with the spinal anesthetic. After one hour of control tracing he obtain-

ed a second hour of electrocardiograph when cyclopropane was superimposed in the same animal to anesthetic levels. As a final step in the experiment he then withdrew 1 cc. of cerebrospinal fluid and injected it intravenously in the same dog still anesthetized with cyclopropane. Immediately the animal exhibited profound arrhythmias, ventricular fibrillation, and death. It is encouraging, therefore, to know that a vasopressor as efficient as Vasoxyl is being developed and is not producing this cardiac irritability when used with cyclopropane.

Ergot preparations should be used sparingly on indication or not at all in patients who have received vasopressor drugs. This is particularly true in the presence of potential or labile hypertension and in obstetric toxemias. A major incompatibility or adverse summation of action of vasopressors is evident when ergot and some form of vasopressor are used concurrently. Therefore, it is particularly dangerous to use standard ergonovine for intravenous administration or ergotrate in the obstetric patient who has had a spinal anesthetic with ephedrine or some similar drug as a prophylactic or therapeutic vasopressor. By referring to the master table we see that tyramine is a vasopressor with an organic structure similar to that of epinephrine. This compound, tyramine, is an alkaloid of ergot and is a vasopressor twice as potent as ephedrine. Thus, when ephedrine and ergonovine are administered together or within a short space of time to an unanesthetized patient or to a patient under spinal anesthesia, critical hypertension may be developed. In one such patient receiving this combination in a Baltimore hospital critical hypertension and total permanent hemiplegia developed immediately after this type of administration. Six other near fatalities have been reported to us in which this incompatibility was permitted to exist. Therefore, it is of particular importance for the anesthetist and the obstetrician to substitute pitocin for standard ergonovine or ergotrate as an oxytocic in those cases of patients delivered by cesarean section or vaginally with any form of vertebral conduction anesthesia. This is of even greater importance when the patient has hypertensive vascular disease or hypertension associated with toxemia of pregnancy.

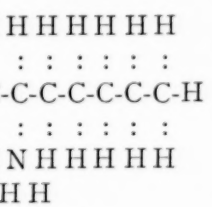
Dextran

Recently the Swedish pharmacologists introduced a new inert plasma substitute as dextran. This is a polysaccharide that in 6 per cent concentration is of the same viscosity as human plasma. It has the advantage over saline of remaining in the circulation for twenty-four hours or more. It has a further advantage of holding red cells in more even suspension, thereby reducing the tendency toward rouleaux formation. Dextran has been administered in many thousands of cases without producing reaction. It is, therefore, recommended to sustain blood pressure in those patients in whom the use of a vasopressor is contraindicated. Examples of this type are: (1) patients with malaria, (2) patients with sickle cell anemia, and (3) patients undergoing cyclopropane anesthesia.

Oenethyl (Ea-1 or 2—Methylaminoheptane)

In 1944 Dennis Jackson intro-

duced a straight chain vasopressor with the following structural formula:



The average effective dose by the intramuscular route is 50 to 100 mg. and by the intravenous route 5 to 50 mg. Roman-Vega and Adriani in their preliminary experience indicated that this drug is effective in restoring and maintaining blood pressure and produces noticeably fewer side effects than those seen with the epinephrine series. The drug should certainly be kept in mind when one is dealing with a patient who has a history of complicated or unfavorable responses to epinephrine.

USE OF THE VASOPRESSORS AS LOCAL VASOCONSTRICTORS

Braun of Germany and Pitkin in America emphatically reported the valuable local anesthesia potentiating effect of epinephrine in a 1:100,000 concentration. We have confirmed the value of this agent, both in its potentiation and its prolongation of local anesthesia. In some patients a concentration of 1:200,000 epinephrine is adequate. Andros recently reported the primary effect of epinephrine alone in 1 mg. doses in the subarachnoid space. This unexpected action indicates that our knowledge of the pharmacology of this series of drugs is by no means complete.

INDICATIONS FOR THE USE OF THE VASOPRESSORS

Prophylactic vasopressor drug therapy is indicated for all hypotensive patients and for most normotensive patients preliminary to major vertebral conduction anesthesia by spinal, caudal, or peridural routes. In many clinics the routine prophylactic dose of ephedrine is 50 mg. by intramuscular administration for all patients receiving spinal anesthesia. We have had better results with simultaneous intravenous administration of 5 to 10 mg. of Drinalfa, Desoxyn, or Methedrine brands of desoxyephedrine.

In critical hypotensive emergencies of patients undergoing operations with general anesthesia there is a time preliminary to or concurrent with the institution of whole blood transfusions that vasopressors are indicated as temporary expedients. Under such conditions it is imperative to keep the dose by the preferable intravenous route as small as needed for therapeutic response to the chosen vasopressor. It is our opinion that 5 to 10 mg. desoxyephedrine or methoxyamine by intravenous administration will restore hypotensive blood pressure to normal range within one to two minutes in these situations. In extreme hypotension we have found that intramuscular vasopressor therapy is inadequate for the prompt restoration of a safe range of blood pressure. In severe sudden hemorrhage 15 to 20 mg. of desoxyephedrine or methoxyamine or 30 to 50 mg. of ephedrine may be needed to sustain the patient until the institution and execution of transfusion therapy.

In re-establishing cardiac function after cardiac arrest intracardiac injection of epinephrine and intravenous administration of other vasopressors have greatly contributed to the restoration of the patient.

In such situations the adjunctive intravenous administration of 4 to 10 cc. of 1 per cent procaine is indicated.

Administration of Anesthesia to the Patient with Severe Asthma

It is not infrequent for patients with allergic bronchial asthma to require anesthesia. Many of these patients are taking daily several injections of epinephrine, ephedrine, or isopropylarterenol, known by the trade name of Isuprel or Aludrine. For these patients any general anesthetic that diminishes respiratory excursion through direct action on the respiratory center is dangerous. In this group we find pentothal sodium and cyclopropane outstanding. Likewise, nitrous oxide with less than 25 per cent oxygen could contribute to a deepening anoxemia. Because of the fact that the last two agents that have the structural formula of isopropylarterenol (see table) produce relaxation of the bronchi without raising arterial blood pressure, we recommend 5 mg. by mouth as a standard form of premedication before general anesthesia.

Even though ether in anesthetic doses relaxes the bronchi, there is some danger of its producing an induction anoxia because of its irritation.

Should the asthmatic patient under general anesthesia develop a visible anoxia, we recommend the intravenous use of 0.1 to 0.5 mg. doses of isopropylarterenol and 5 cc. of coramine intravenously. We believe that it is safer in the asthmatic patient to use a combined anesthesia of a regional nerve block with a supplement of 50 per cent oxygen and 50 per cent nitrous oxide, to which is slowly added the appropriate concentration of ether.

Complications Resulting from Vasopressor Drug Therapy

Almost every hospital has records of patients receiving inadvertently or injudiciously dangerous dosages of vasopressor agents. Cerebral hemorrhage, hemiplegia, and death have resulted from injections of the equivalent of 1 cc. of epinephrine or 100 mg. of ephedrine. An even greater number of patients have been endangered, to indicate the gravity of overdosage. We mention two cases from our service that illustrate abnormal increases in blood pressure from overdosage and contraindicated dosage of desoxyephedrine. The first patient was a normal multipara who received saddle block spinal anesthesia for delivery. Her initial blood pressure decreased from 120 mm. Hg systolic and 70 mm. Hg diastolic to 80 mm. Hg systolic and 50 mm. Hg diastolic. Inadvertently, 60 mg. of desoxyephedrine was administered intravenously. The blood pressure promptly rose to 230 mm. Hg systolic and 140 mm. Hg diastolic, and almost one hour was required for a slow return to normal pressure. The second patient under caudal analgesia had a hypertensive tendency during pregnancy. Her initial blood pressure of 170

mm. Hg systolic and 90 mm. Hg diastolic slowly decreased to 120 mm. Hg systolic and 80 mm. Hg diastolic. Desoxyephedrine, 5 mg., was administered intravenously. Her pressure promptly rose to 220 mm. Hg systolic and 130 mm. Hg diastolic. Both patients complained of intense headache. The blood pressure in both cases returned to normal without leaving residual complications.

Because of the fact that morphine raises intracranial pressure, it should be used sparingly in this condition. The inhalation of 100 per cent oxygen, Fowler's position, and inhalation of a pearle of amyl nitrite are indicated.

Whenever a patient complains of headache after administration of a vasopressor, or nausea and dizziness after its use, we believe that no further administration of the drug in question should be used.

We are submitting the following technic as an example of our most efficient method of controlling hypotension in poor risk cases. It is the same technic that we utilize with continuous spinal anesthesia for cesarean section. It has been developed from experiences associated with our use of this method of anesthesia in 1,800 cesarean sections without a single maternal mortality on the operating table or within eight days of puerperium:

1. After local anesthetic preparation of skin wheal and desensitization of the subcutaneous tissue. intraspinous and the ligamentum flavum, a 17 gage Tuohy spinal needle is inserted usually in the third or second or fourth lumbar interspace deftly into the subarachnoid space with the directional bevel directed cephalad.

2. A properly sterilized small bore polythene plastic catheter is inserted 3 to 5 cm. into the subarachnoid space beyond the needle, and the needle is withdrawn as a sleeve against stabilizing counterpressure on the catheter.

3. At the exact second that a test dose of 15 mg. of 1.5 per cent metycaine in Ringer's solution is injected, a covering prophylactic dose of 5 mg. (¼ cc.) Drinalfa (desoxyephedrine) is injected into a moderately rapid intravenous drip of 5 per cent glucose and distilled water or saline solution according to the salt fluid balance of the patient.

4. Administration of 100 per cent oxygen is begun.

5. After five minutes a second 15 mg. dose of metycaine is injected, and this and each subsequent 15 mg. dose of metycaine are covered with an intravenous dose of 5 mg. of Drinalfa.

6. Anesthesia adequate for the operation is present in ten to fifteen minutes with this technic. For the normal patient it offers almost absolute protection against hypotension. In fact in our last thirty-five cases the mean alteration of either systolic or diastolic blood pressure has been less than 6 mm. Hg.

7. Because the baby is unnarcotized, prompt aspiration of the air passages must be performed to prevent insufflation of mucus or amniotic fluid. In fact, some operators prefer a minimal barbiturate sedation of the mother before operation to quiet some of the vigor of the primary fetal respirations.

8. After delivery of the baby a slow pentothal sodium drip of 1 Gm. per liter of fluid is frequently a pleasing adjunct.

(Continued on page 24)

SELECTION OF STUDENTS FOR SCHOOLS OF ANESTHESIA

Miriam G. Shupp, R.N.*
Cleveland

For the conscientious administrator or the admissions committee of a school of anesthesia for nurses, one of the most important and sometimes one of the most difficult tasks that continually faces them is the selection of students for the program.

The selection of students for the school depends primarily on the applicant's selection of the school, and if the number of applications continues to exceed, with a comfortable margin, the number admitted to the program in any given period, selection may be somewhat less difficult. But if this margin diminishes or vanishes, selection then resolves itself into a choice between reducing the number admitted, to permit continued careful screening, and admitting undesirable applicants to the program.

To my knowledge there is no program in anesthesia for nurses being conducted on a purely educational basis, or, stated in another way, there is no program that does not take into consideration the anesthesia service rendered by the students to the institution during their period of training. It is probably true that today in our schools the precedence that either service or education takes over the other runs the gamut from an all-service program, with educational and social implications far in the background, to a continual striving on the part of the hospital administration, the school faculty, and service personnel to conduct a sound educational program and at the same time meet the service needs.

For those who are responsible for the selection of students in the schools in the latter category, more accurate criteria for evaluating the applicants are undoubtedly desirable. Let us consider some of the results of accepting undesirable students who later must be dismissed, and also the results of accepting students without proper qualifications and allowing them to complete the course. On these two points, I shall quote from Emily Cardews' article on "Evaluating Admission Requirements for Schools of Nursing," *American Journal of Nursing*, March, 1949, since the author's statements also apply to students in a school of anesthesia:

> The admission to any school of students who must withdraw before the completion of the course has many detrimental effects upon the school and upon the students who must be dismissed. The presence in the school of students who are unable to successfully carry the program tends to lower the level of instruction offered by lowering the "average" of the total group for which courses must be planned. A great deal of the instructors' time, which might

Read before the Assembly of Directors of Schools of Anesthesia, Atlantic City, Sept. 17, 1950.

*Director, University Hospitals of Cleveland School of Anesthesia.

profitably be spent in guiding and enriching the program for the good student is necessarily spent with the poor student who cannot carry the program independently. The presence of the failing student in the school, and her subsequent withdrawal lowers the morale of the entire group. . . . The individual student who returns to the community cannot help being traumatized by feeling herself a failure. . . . There are, in addition, economic factors to be considered. In schools of nursing where the student pays the cost of her tuition, the economic loss to the individual or her family if she fails in the school has definite importance. In some schools operated by hospitals, much of the expense of the student's early education is carried by the hospital, to be repaid by the student in nursing service during her advanced clinical experience. The withdrawal of large numbers of students before their contribution to nursing service equals or exceeds the cost of preclinical education, results in either a loss to the hospital or a decrease in the budget available for education.

The elimination of probable failures, although important, should not be the sole objective of the admissions program. If the professional nursing school is to graduate young women qualified to render satisfactory nursing service on a professional level, the admissions program must not only attempt to eliminate probable failures, but must also endeavor to select those young women who possess the qualifications necessary for success on this level.

If I may restate Miss Cardews' last sentence and apply it specifically to our schools of anesthesia, it would be stated thus: If the school of anesthesia engaged in the training of nurse anesthetists is to graduate anesthetists qualified to render satisfactory anesthesia service on a professional and not merely a technical level, the admissions program not only must attempt to eliminate probable failures but also must endeavor to select those nurses who possess the qualifications necessary for success in this highly specialized and important field of hospital service.

The present admissions program of the University Hospitals of Cleveland School of Anesthesia has been developed over the past five years. The program includes processing an application, a personal interview whenever possible, a report on the physical and mental health of the applicant, obtaining records from all schools attended, and a post-entrance physical examination and psychologic tests.

The application form (which has been in a more or less constant state of revision and has been used in its present form for about six months) includes the usual data—name, address, marital status, number of children if any, education, references, and so forth. We also ask whether the applicant has any responsibility that might interfere with her course of study. If the applicant's answer to this question is, "Yes," the problem is carefully studied before accepting the applicant.

The medical examination form that the applicant is requested to submit with the application contains a report from a physician of the applicant's family history, medical history, and a recent physical examination. The applicant is required to have her vision checked (we ask a specific question on color blindness) and her hearing checked, and the form contains space for statements on condition of teeth, feet, heart, and lungs. We do not require a roentgenologic examination of the chest at the time of application, but the applicant is required, if accepted, to have such an examination and submit a report two months prior to her scheduled admission date. We ask specifi-

cally if she suffers from dysmenorrhea and, if so, if bed rest is required and for how long. We would reject an applicant on the basis of required bed rest at the time of menstruation.

We have an efficiency record form for the professional references, in which we ask specifically for information regarding the applicant's alertness, emotional maturity, co-operativeness, acceptance of responsibility, ability to meet emergencies, extent of professional knowledge and skills, qualities for leadership, and neatness and grooming. We also request information on whether the applicant has ever been involved in an accident resulting from failure to interpret correctly or carry out a physician's or nursing supervisor's orders. We also ask whether the applicant is considered to be a suitable candidate for this field of specialization. We require references from the director or dean of the school of nursing, from the applicant's present or most recent employer, from a nursing supervisor under whom she has worked for a period of at least six months, and from a physician who has knowledge of her professional qualifications. Also, a letter of reference is required from one person outside the medical, dental, or nursing profession who knows her well.

We have prepared our own high school transcript form, which we send to the high school. We request the school of nursing to furnish a transcript of the applicant's record, but we ask the applicant to obtain the college transcript. We also write to the licensing board in the state in which the applicant is registered to verify current registration.

If the applicant is within reasonable traveling distance, she is requested to visit the school for a personal interview. The impressions of the interviewer (one of the members of the committee on admissions) are recorded on a form prepared for this purpose.

When all records and recommendations have been received, the application is reviewed by the committee on admissions. This committee consists of the director of the school, the educational director, and two senior members of the anesthesia staff.

In evaluating an applicant's qualifications we have tended to give more weight to certain aspects of the record than to others. We have not attached so much importance to high school grades as to the school of nursing grades. But we are interested in the applicant's background of science in high school and what these grades are in relation to those in other subjects. We may give favorable consideration to an applicant whose background is deficient in science if she has been graduated with a high average from one of the better schools of nursing. We attach more importance to the records of some schools of nursing than we do to others. We give more weight to the efficiency report from the director or dean of the school of nursing from which the applicant was graduated and to the record of efficiency from the last employer and the supervisor under whom the applicant worked than to the references from the physicians and the person outside the profession. Experience has shown that the physicians and the nonprofessional person tend to be less objective in their evaluation

of the applicant.

If grades are average or above and the references are in agreement that the applicant is a well adjusted, industrious, and well motivated person, her application would in all probability be accepted. But even though the grades may be above average, the applicant would in all probability be rejected if several of the references list undesirable personality traits, and especially if they are in agreement. The age of the applicant and background of experience are also taken into account.

If the applicant is rejected or accepted with reservations by one or two members of the committee, the record is restudied. If the applicant is questionable on the basis of her scholastic attainments, we request that the applicant take a general information test. For this purpose we have been using one of the forms of the Otis test, and the decision is rendered after the test is scored. If the applicant is questionable on another phase of the record, a decision is reached after a re-evaluation by the committee on admissions.

The difficulty in judging an applicant's qualifications on the basis of scholastic records, references, and a personal interview has made us feel the need for additional criteria for evaluation. We therefore decided to see if a general information or psychologic test would be of value. For the last four and a half years we have administered the Otis Self-Administering Test of Mental Ability, Higher Examination, Form A, to all students who enter the school, and for the past four years we have also been administering the American Council on Education Psychological Examination. These tests are administered during the students' first week in the school. We have administered the Otis test to 138 students and the American Council test to 107 students, and the first study on the results of these tests has just been completed.

In this study we have used only the records of those students on whom we had complete data, i. e., school of nursing grades, school of anesthesia grades, and Otis and American Council test scores. This eliminated those to whom the Otis test had been administered but not the American Council test, all students now in the school, students who withdrew or were dismissed, and a few of our former Navy students for whom we did not have the school of nursing record.

The rank-difference method of determining correlation coefficient was used. Although the number of cases is higher than that ordinarily used with this method of determining correlations, it was selected because of difficulty in obtaining actual scores. The correlation coefficient was obtained for each of the following groups of scores: (1) school of nursing grades and Otis test, (2) school of nursing grades and A. C. E. test, (3) school of nursing grades and school of anesthesia grades, (4) school of anesthesia grades and A.C.E. test, and (5) school of anesthesia grades and Otis test.

There was no correlation between school of nursing grades and either of the tests used. The correlation between school of nursing grades and the A. C. E. test scores was .001; that between school of nursing grades

and Otis test was -.071. These results may have been due in part to the fact that some school of nursing grades were numerical and some were letter grades, and for the letter grades it was necessary for us to use arbitrary values. Nevertheless, these results would seem to indicate that we cannot predict successful performance in the school of anesthesia on the basis of the applicant's school of nursing grades. This was further shown to be true by doing a rank correlation between school of nursing grades and school of anesthesia grades, which was .09, or no correlation.

The correlation between school of anesthesia grades and the Otis test scores was .293, and the study done on the school of anesthesia grades and the A. C. E. test scores showed a higher positive correlation of .356. Although these are not high correlations, the results indicate that on the students to whom these tests were given, had we used either one of the tests alone and eliminated all other criteria for judging mental abilities, we would have erred only about five times in 100 instances.

On the basis of these findings, the school of nursing grades of all students in this group were studied. It was found that the smaller schools of nursing tend to grade higher. There were nine students in the study from schools of 100 beds or less, and the nine students all had an average grade of 85 or above. Seven of the nine had an average grade of 90 or above. It was found that the highest percentage of average grades below 85 were in schools of nursing of 500 or more beds. There were twenty-four students in the study from such schools. Of these, fifteen had averages below 85, and nine had averages above 85; only two of the twenty-four had an average of 90 or more.

The school of nursing records of those students who were graduated from schools approved by the National League of Nursing Education were then studied. All such approved schools were in hospitals of over 100 beds. There were twenty-seven students in this group. There were no averages above 95. Three of the twenty-seven students had averages between 90 and 94.9, two students had averages between 75 and 79.9, and the remaining students (twenty-two) had averages that ranged between 80 and 89.9.

On the basis of the studies with the school of nursing grades, it would seem that these grades alone are not a valid measurement for prediction of success in the school of anesthesia. While such records are useful, we find that it is necessary to take into consideration not only the grades of the applicant but also the size and type of institution and the rating of the school of nursing connected with the institution.

Since the highest correlation was obtained between the school of anesthesia grades and the A. C. E. test scores, a frequency distribution was prepared to determine whether we could set a critical score below which our probability of failures would be high. This study was made on 107 records and includes the students who completed the course, those who withdrew or were dismissed, and the members of our present senior class. We ranked those on whom we have complete records

FREQUENCY DISTRIBUTION SHOWING RELATIONSHIP OF SCHOOL OF ANESTHESIA GRADES TO PERCENTILE RANK ON A.C.E. TESTS

A.C.E. PERCENTILE RANK	HIGHEST GROUP	MIDDLE GROUP	LOWEST GROUP	WITHDRAWALS, DISMISSALS
90 - 99.9	8		2	1
80 - 89.9	4	4	2	
70 - 79.9	5	2	4	
60 - 69.9	7	4	1	
50 - 59.9	3	6	3	1
40 - 49.9	1		4	1
30 - 39.9	5	5	2	1
20 - 29.9		2	5	
10 - 19.9	2	4	4	4
0 - 9.9		3	5	2
TOTALS	35	30	32	10

and the members of the present senior class according to their school of anesthesia grades and divided the group into three parts: high, average, and low. They were then grouped according to the student's percentile rank on the A. C. E. test. The results of this study are shown in the table.

As already stated, as a result of the fairly high correlation shown between the school of anesthesia grades and the A. C. E. test results, the purpose of this study was to determine if we could justifiably set a critical score for the A. C. E. test below which we would reject applicants. On the basis of our findings, had we set the critical score at the 10th percentile and used the A. C. E. test as the only criterion for judging the applicant's intellectual qualifications for the study of anesthesia, we would have rejected none in the high group, three in the average group, five in the lower group, and two dismissals or withdrawals. If we had set the critical score at the 20th percentile, we would have eliminated two in the highest group, seven in the average group, nine in the lowest group, and six who withdrew or were dismissed. It seems significant that the scores of six of the ten students who withdrew or were dismissed are below the 20th percentile. Of the remaining four who were dismissed or withdrew, one student was dismissed for reasons other than professional abilities, and the other three withdrew for reasons other than ability to master the course content.

There are, undoubtedly, other schools that are using the A. C. E. test. If so, a study similar to ours, in which all available material from other schools was used, might give us information that would be helpful in working out more adequate evaluation procedures.

In the meantime, as the result of our study, there are two experiments that we would like to consider putting into operation in the school, and they both present obstacles. The first is to evaluate the student on the basis of the A. C. E. test *before* she is accepted, by administering the test through a local agency, such as a high school, in the city in which the applicant lives. This procedure would not be necessary in all cases, as, of course, there are

applicants for whom such a test would be superfluous; as an example, a nurse who has a record of outstanding achievement in high school, school of nursing, a university, and in the practice of nursing. Such a testing procedure presents several obstacles: first, finding a local agency to do the testing; second, the applicant's willingness to be tested as an application procedure; third, her willingness to pay a fee to the administering agency.

The second experiment, which cannot be carried out without the first, would be to set a critical score below which we would not accept applicants. On the basis of our figures, I should like to see the 20th percentile set as the critical score. But this too presents obstacles. In the beginning of the article I said that if the number of applicants continues to exceed, with a comfortable margin, the number admitted to the school in any given period, the selection may be somewhat less difficult. Today, for our school, that margin has diminished, as I presume it has for the majority of the schools, if not all of them. And not only has the number of applicants per school diminished, but, on the other hand, apparently the need for anesthetists in the field has increased. And when demand exceeds the supply of workers, the standards are necessarily lowered. It is a proved fact from studies in other fields, however, that it is better to leave some positions unfilled than to lower the admission standards in the schools to dangerously low levels.[1]

1. Adkins, Dorothy C.: *Construction and Analysis of Achievement Tests* (Washington, D. C.: U. S. Government Printing Office, 1947).

On the basis of present trends it may be expedient, if the experiment can be put into operation, to set the critical score at the 10th percentile. And if it is not possible to put such a program into effect in the near future, we feel, at any rate, that the results of our study will be helpful to us in evaluating future applicants to the University Hospitals of Cleveland School of Anesthesia.

Summary

The admission procedures of the University Hospitals of Cleveland School of Anesthesia have been discussed, and the results of studies based on school data collected over the past five years have been presented.

It has been suggested that those schools using the A. C. E. test as a part of their admission procedures pool the data for statistical studies, with the object of arriving at a better method of evaluating applicants for schools of anesthesia.

VASOPRESSORS

(Continued from page 17)

Summary

All of the standard vasopressors have been discussed with reference to standard dosages, relative potencies, complications, and indications and contraindications for their use.

We believe that every anesthetist should thoroughly understand the use of at least two of these agents. Ephedrine is still adequate for temporary restoration of blood pressure in most cases of hypotension. The other promising vasopressors present certain advantages but should be studied with caution.

PROBLEMS IN ANESTHESIA TODAY

Who Gives Anesthetics in Hospitals

V. M. Hoge, M.D.*
Washington, D. C.

Little more than one hundred years ago an important milestone in hospital history was reached: the first demonstration of ether anesthesia took place in the mid-1840's. Although many surgical procedures were known to the surgeons of that time, the lack of anesthetics, the intense pain suffered by the patient, the speed with which the surgeon had to work, and the almost inevitable infection of wounds resulted in high mortality among surgical cases.

Since that first experiment in the use of anesthesia extraordinary progress has been made in the development of various anesthetics and their use, and countless operative procedures have been devised. Last year a total of more than 7,000,000 surgical operations were performed in hospitals.[1] Most of these would have been impossible without anesthesia.

Until fifty years ago almost no one specialized in anesthesiology. In 1889, however, the first graduate nurse was appointed nurse anesthetist at the Mayo Clinic. About the time of World War I the first formal school for training nurse anesthetists was established at Lakeside Hospital at Cleveland, Ohio. Two years ago more than 50 recognized training schools were in existence with annual graduating classes of somewhere near 400.[2] Altogether, there are at present some 5,000 nurse anesthetists employed in hospitals, four fifths of whom are on a full-time basis.[3]

In 1937 the American Board of Anesthesiology was organized. Since then more and more physicians have been making careers as specialists in anesthesiology. By July 1, 1949, a total of 524 certificates had been awarded in this field.[4]

In addition to the medical anesthesiologist and the nurse anesthetist there is a group of physicians who, although not certified by the specialty board, have specialized to some degree in this work. It has been estimated that this group probably numbers about 900.[2]

Read before the Fifty-second Annual Convention of the American Hospital Association, Section IV, "Problems in Anesthesia Today," Atlantic City, September 20, 1950.

*Assistant Surgeon General, Associate Chief, Bureau of Medical Services, Public Health Service, Federal Security Agency.

1. Statistics and Directory Issue. Hospitals, Part 2, 24: 58, June 1950.
2. Storm, John M.: The truth about anesthetists. Trustee 1: 1-4, March 1948.
3. Hospital service in the United States. J. A. M. A. 133: 1077, April 12, 1947.
4. Medical education in the United States. J. A. M. A. 141: 63, Sept. 3, 1949.

Then, of course, there remains a group of persons without special training in the field—usually general practitioners, interns, or nurses—who may administer anesthesia in some hospitals. Generally, I believe, these hospitals are likely to be relatively small hospitals, probably located in the more rural communities where the services of persons with special training in the provision of anesthesia are not available.

So much for a brief background. We come now to the question, "Who gives anesthetics in hospitals?" The most complete and the most recent information on this question comes from the hospital surveys initiated by the Commission on Hospital Care. In 1945, as part of the Commission's activities, the various states were encouraged to undertake studies of their hospital facilities. Among the detailed information obtained from hospitals were answers to questions on anesthesia service and, of particular interest to us, some answers to the question, "Who usually gives the anesthetic?"

The replies to this question were tabulated for the hospitals in a sample of nineteen states. Wherever possible, at least two states were selected from each main geographic region. The total hospitals represented in the tabulations numbered 777.

The persons giving anesthetics were classified in certain groups or combinations of groups, mainly: physicians, with separate groupings of those in private practice and those employed in hospitals; nurses, also separated into those in private practice and those in hospital employment; and various combinations of these groups, such as a hospital physician and nurse operating as a team, or a private physician and a private nurse likewise acting as a team.

There was no indication from the tabulated material as to whether physicians giving anesthetics were certified medical anesthesiologists, physicians who were more or less specializing in anesthesia, or general or other practitioners without special training in this field. Similarly, it was not indicated whether nurses were trained nurse anesthetists or untrained personnel.

Of all 777 hospitals slightly more than one third (34.4 per cent) reported that private physicians usually gave the anesthetic. Nearly the same proportion (32.3 per cent) reported that the hospital nurse administered the anesthetic. Next in order was a team made up of the hospital physician and hospital nurse, although this was reported by only 8.4 per cent of the hospitals. The use of a hospital physician (not in combination with a nurse) was reported by 8.2 per cent of the hospitals.

No more than 5 per cent of the hospitals used any one of the several other groups or combinations of personnel for giving anesthetics. I have here the complete breakdown of the various personnel used by the hospital in case you wish the entire range of answers (table 1).

As we would expect, there was little uniformity among the states in the category of persons giving anesthetics in hospitals. But, when reports from the various hospitals were tabulated by size of the facility, a substantial amount of consistency was found in the answers.

In the smaller facilities—those with fewer than 50 beds—private

TABLE 1.—PERSONNEL ADMINISTERING ANESTHESIA IN HOSPITALS IN 1945

PERSON GIVING ANESTHETIC	HOSPITALS REPORTING	
	NUMBER	PER CENT
Total hospitals reporting	777	100.0
Private physician	267	34.4
Hospital nurse	251	32.3
Hospital physician and hospital nurse	65	8.4
Hospital physician	64	8.2
Private physician and nurse	38	4.9
Private physician and hospital nurse	35	4.5
Hospital physician and private physician	28	3.6
Private nurse	19	2.4
Hospital and private nurse	8	1.0
Hospital physician and private nurse	2	0.3

physicians were more likely to administer the anesthesia than any other type of personnel; 46 per cent of the hospitals reported the use of private physicians. The answer "nurses employed by hospitals" was next in frequency among the small facilities, with 31 per cent of the small hospitals making this response. The use of hospital physicians was reported by 12 per cent of the smaller facilities with a scattering of answers relating to other types or combinations of personnel from the few remaining hospitals.

Among the medium sized hospitals, and this group includes those with 50 to 250 beds, the use of the hospital nurse or of the private physician was reported with almost equal frequency. About one third of the reporting hospitals used the hospital nurse; another one third used private physicians.

For the largest facilities—those with 250 or more beds—the hospital nurse was given as the most frequent answer to the question of who gives the anesthetics; 31 per cent of the large facilities gave this reply. Almost as frequent, however, was the reply, "hospital physician and hospital nurse" as a team. This answer was reported by 29 per cent of the hospitals with 250 beds or more. However, a substantial proportion of these facilities, 16 per

TABLE 2.—CLASSIFICATION OF ANESTHESIA PERSONNEL ACCORDING TO HOSPITAL SIZE

PERSON GIVING ANESTHETIC	SIZE OF HOSPITAL			
	Under 50 beds	50-99 beds	100-249 beds	250 or more beds
Number of hospitals reporting	172	244	268	93
Percentage distribution:	100.0	100.0	100.0	100.0
Private physician	45.9	36.9	31.0	16.1
Hospital nurse	30.8	36.1	30.2	31.2
Hospital physician and hospital nurse	1.8	4.1	9.3	29.0
Hospital physician	11.6	6.5	9.0	4.3
Private physician and nurse	2.9	2.9	7.4	6.5
Private physician and hospital nurse	2.9	4.9	5.2	4.3
Hospital physician and private physician	1.8	3.7	3.0	8.6
Private nurse	2.3	2.9	3.0	-
Hospital nurse and private nurse	-	1.6	1.5	-
Hospital physician and private nurse	-	0.4	0.4	-

cent, reported the usual use of the private physician in anesthesia service.

I also have with me the detailed breakdown of personnel used in hospitals of different size, in the event you are interested in these details (table 2).

In conclusion, in answer to the question, "Who gives anesthetics in hospitals?" I think we can say that in about one third of all hospitals, large and small, the anesthesia is administered by a private physician who may or may not have specialized training in this field. In another third of the hospitals it is given by a nurse in the employ of the hospital. In another third it is administered by other categories of persons or combinations of persons, among whom hospital physicians and hospital nurses, in combination, predominate.

From the Viewpoint of the Hospital Administrator

Joseph G. Norby*
Milwaukee

The department of anesthesiology in the hospital has developed into one that is on a par with the other departments commonly maintained in hospitals rendering services that supplement the care of the patient by the attending physician. Anesthesiology, like pathology and radiology, must be recognized as one of the important branches of specialized medicine essential to good care of the patient in the hospital. Its application is being extended beyond its commonly comprehended sphere of usefulness in connection with surgical procedures. It has expanded into the field of gas therapy and specialized diagnosis and other special areas best known to the specialists here present. This is a development that has come during the last twenty-five years. Lundy[1] described in a most graphic way the growth and development of the specialty during these years and concluded with a description of the variety of agents in present use and the skill and judgment essential to good performance on the part of the anesthetist if good results are to accrue to the patient.

The foregoing adds up to this: The department of anesthesiology in the hospital occupies a place of importance equal to that of the departments of radiology and pathology, and its place within the structure of the hospital is similar in most respects to that of the older specialties that have traditionally been closely associated with the over-all service picture in the hospital.

The development of the specialty and the entry of medically trained persons into the field have brought the organizational problem into sharp focus. It must be

*Administrator, Columbia Hospital.

1. Lundy, John S.: Trends in anesthesiology. Anesthesiology 11: 238-244, March 1950.

borne in mind that only a few years ago the medical anesthetist was a rarity. Nurse anesthetists were the accepted technicians, and the attending doctor was the specialist who supervised the whole procedure with respect to the selection of the agent to be used and the conduct of the anesthesia. There is still a shortage of medically trained anesthetists, and this shortage will, in all likelihood, not be relieved in the foreseeable future, although more and more physicians are being attracted to the field.

Hospitals are at the present time satisfying the needs of the public for this service most generally by applying four organizational methods, listed in order of frequency of occurrence: (1) all nurse anesthetists, (2) medical anesthetist direction and nurse anesthetists, (3) all medical anesthetists, (4) no formally organized department, local specialist being called by surgeons for service when needed.

The second method seems to be the system of preference at this time for several reasons, the most important perhaps being the shortage of medically trained anesthesiologists. There may be other valid reasons for the preference, but discussion of them may properly be deferred.

The advent of physicians into the field of anesthesia, and thus into one of the important departments of the hospital, brought with it an administrative problem that was not in evidence during the years that this work was exclusively the function of nurses with special training in anesthesia. The same problem had previously developed in relation to physician heads of the departments of pathology and radiology. Therefore any discussion of the subject of the relationships of the medical departments in hospitals inevitably includes every department ancillary to the services of the regular attendants who practice medicine in the hospital. The specialty services that I have referred to found their natural home in the hospital from the beginning.

The American College of Surgeons stimulated the growth and development of these departments in hospitals by making it a requirement for approval that these departments be established and that they be headed by a qualified member of the medical staff. This requirement was a wise one and was laid down in full recognition of the fact that no hospital could give adequate patient care unless these services in aid of diagnosis and treatment were made available.

The development of the standardization program of the American College of Surgeons soon brought departments of radiology, pathology, and anesthesiology into every good hospital in the country, and, since we are here discussing problems relating to anesthesia in hospitals, let me say that a liberal sampling of administrative opinion reveals no difference of view relative to the nature or the importance of the service. These are areas of common agreement.

The administrative problem to which I refer involves primarily the definition of what the relationship should be between the physicians, the hospital, and the patient.

In this area there are, by and large, rather sharp differences of

opinion. The thesis that the physician-patient relationship should be direct in all categories, regardless of conditions under which the services are rendered, is quite universally held by the physician specialist. Hospitals and the public generally do not agree with this philosophy, unless the entire relationship is direct and unless institutional influences are wholly absent. I am now referring to: (1) patient choice of physician, (2) study and diagnosis, (3) full responsibility for the therapeutics involved, and (4) fee for service systems, i. e., method of payment.

The following observation gives point to the disagreement:

1. The anesthetist who renders service in supplementation of the care of the patient by the attending physician has not usually been chosen by the patient himself.
2. The preoperative study and preparation have been the responsibility of the physician whom the patient has chosen and in whom the patient has full confidence.
3. The attending physician is the responsible party in the case and carries responsibility for liability.
4. The attending physician carries full responsibility for the course of treatment and the ultimate outcome.

The volume of work that an anesthesiologist does in a hospital is not a direct result of his status among his confreres or the public confidence that he enjoys. It is due almost wholly to the position that he occupies in the hospital. In the great majority of cases he is protected in his exclusive rights in the hospital by the fact of his appointment by the hospital and his status on the medical staff of the hospital.

It seems clear that the position and relationships of the specialist anesthesiologist partake of certain basic features that are different from those of the general practitioner, the surgeon, the internist, or the other physicians who perform clinical services to the public either in or out of the hospital. The very nature of the practice of the specialty of anesthesia in itself precludes close adherence to the basic philosophy of direct relationship. Consequently, the fundamental points of conflict involve method and amount of compensation and contractual relationship. There is in the position and relationship of the anesthesiologist a deviation from the norm that justifies the basic thesis referred to previously, and since there is clearly a variance in the first three principles, there can be no good reason why there should be insistence upon one item that is held to be inflexible: the method of compensation.

Hospitals throughout the country do not follow a common practice in the compensation arrangements maintained with the specialty departments. Those most commonly used are: (1) salary, (2) commission based upon percentage of gross or net, and (3) fee for service, either (a) collected by hospital or (b) collected by physician.

I am not endowed with sufficient wisdom to offer any one simple formula that will be satisfactory to everyone everywhere. However, inasmuch as most hospitals now maintain contractual relationships with their specialists that satisfy both parties and

provide good service to the public, it would seem wise to continue the system, which, although not without fault, is based upon mutual understanding, mutual faith, and mutual desire to secure the best possible service to the public at prices that are equitable to all.

The problem that we are dealing with today has been with us over many years. It has had careful study by many persons, both professional and lay. Formal resolutions of agreement were entered into with the various specialty bodies in 1939. The American Medical Association affirmed this stand in 1944, the American Hospital Association in 1946-48.

On March 26, 1950, the trustees of the American Hospital Association endorsed a resolution presented by the Joint Commission for the Improvement of the Care of the Patient, which seems to be a logical approach and should be satisfactory to all parties concerned:

BE IT RESOLVED THAT it is the consensus of the "Joint Commission for the Improvement of the Care of the Patient" that Anesthesiology, Radiology, Pathology and Physiatry are professional services rendered in supplementation of the care of the patient by the attending physician; and

THAT it is essential that the unity of the hospital be preserved for the better care of the patient; and

THAT the trend of supplementary professional services is toward practice in the hospital; and

THAT the Joint Commission for the Improvement of the Care of the Patient in the Hospital is opposed to exploitation of either party or the patient; and

THAT it is the considered opinion of the Joint Commission for the Improvement of the Care of the Patient that this problem can and must be solved at the local level.

A more extensive resolution was approved by the Board of Trustees of the American Hospital Association also in March of 1950. This resolution was a reiteration of the one adopted jointly by the various specialty groups in 1939 and was essentially an elaboration upon that resolution.

All the foregoing resolutions are based upon the following premises that:[2]

It is in the public interest that anesthesiology service be available in the hospital for complete diagnosis and patient care.

This specialty service is vital to a high quality of patient care and is properly provided to hospital patients in both in-patient and out-patient departments of hospitals as a part of their diagnosis, treatment, and care.

Physicians who are responsible for providing anesthesiology service to hospital patients also assume administrative responsibility for directing the work of hospital personnel and the use of hospital equipment in the departments under their supervision.

Physicians who provide this specialty service ordinarily have the exclusive privilege of rendering such service to all patients in a hospital.

In the provision of service to the public the granting of exclusive privilege of practice to physicians in this specialty department necessitates control of the rates charged for that service in the hospital.

Hospital reimbursement of physicians for patient care rendered in the anesthesiology department of hospitals that provide the space and the equipment and pay the salaries and operating expenses of the department constitutes a practice that has developed over the years and is acceptable to a majority of physicians directing such departments.

Medicine is not practiced by hospitals but is practiced in hospitals by licensed physicians regardless of method of compensation.

The *Principles of Medical Ethics of the American Medical Association* do not prohibit hospital employment of physicians to provide this specialty service to patients when rendered at the request of their attending physicians.

Variations among local hospital situations preclude the establishment of a single method of compensating physicians working in this specialty department of hospitals as being in the best interest of patient care and applicable to all hospitals.

2. A new statement on hospitals and the practice of medicine. Hospitals **24**: 82, April, 1950.

Net income accruing to a nonprofit hospital from the operation of any department, including specialized medical service departments, should be applied against the total cost of providing hospital services, and therefore the net income of such departments should not be used as the sole basis for determining compensation of staff members in these departments.

Under usual enabling legislation a prepayment hospital service plan may properly furnish this specialty service to subscribers as part of its hospital service benefits.

Most subscribers to prepayment hospital service plans request and are entitled to this specialty service as a hospital benefit under their subscriber certificates.

Physicians, hospitals, and prepayment plans are confronted with the necessity of making available comprehensive coverage, including services rendered in anesthesiology departments of hospitals, to meet the public demand for complete prepaid hospital care.

The activities of groups representative of the specialties are viewed with great concern by administrators for many reasons, but especially because of the effect such agitation may have upon the public mind, which is, to say the least, at this time dangerously unsettled as to its attitude toward the whole question of socialized medicine and health care. Pressure upon hospitals is pressure upon the public, and the public is a dangerous explosive to toy with. The question could be the atomic bomb that for once and all dissipates our entire structure. There are other means for rational people to solve problems.

I am of the opinion that hospital administrators throughout the United States generally adhere to the principles just presented and feel that all parties concerned can be best served by such mutual arrangements as local conditions and local circumstances dictate, all parties being first concerned with providing the best possible care for the patient, and next that none of the parties involved exploits the others.

From the Viewpoint of the Nurse Anesthetist

Verna E. Bean, R.N.
Lexington, Ky.

It is with a deep sense of appreciation that I participate in this discussion. To be a speaker on any program of the American Hospital Association is an achievement, and to be the representative of the American Association of Nurse Anesthetists is a privilege of which I am truly proud. Understanding that the members know me, this privilege leaves me baffled as to how I could possibly have "buffaloed" them into granting me the opportunity to speak my piece. For that is just what I am going to do.

Too long I have protested the approach to a b e t t e r anesthesia service by all of us, the hospitals, the anesthesiologists, and the nurse anesthetists. Before I make even one comment or suggestion, I wish to say that I am speaking on these assumptions: (1) that we as a group sincerely desire to produce that better

service, (2) that we are truly mature, and (3) that anything I say is "with malice toward none."

Dr. Vane Hoge has shown us the distribution of personnel in anesthesia service throughout the country. His are cold statistics, but they are not so chilling as the actualities. He has not told us of the acute shortage of, and the need for, thoroughly prepared and able personnel to cover the anesthesia service, which is the reason, I hope, for this panel discussion. Any of us here will admit that a solution of this problem is not only desirable but an absolute necessity.

Unfortunately, the situation is now even more critical than it was at the time we were requested to participate in this discussion. We are again at war. This war may remain simply the "Korean incident," or it may become a general conflagration. In any event it has influenced and will influence whatever plans or suggestions we may make here. Our problems have been increased. Yet, if we act in unity, we can supply both civilian and military needs.

Although it is commendable to be idealistic, it is more realistic to be practical. Let us have done with speaking high-sounding words of noble service. . .stuff for the orators. Let us come right down to brass tacks and *act* to produce the service we talk about. Let us unite—hospital administrators, anesthesiologists, nurse anesthetists, and surgeons—to produce this service that is one of the most essential to the care of the ill and the wounded.

It is ridiculous that we, persons of supposedly superior intelligence and ability, continue to act as enemies in an armed truce. Let us stop taking potshots at each other. By conduct of this sort we produce nothing, except shameful action, self destruction, and the undermining of public confidence. None of us is perfect, either as individuals or as groups. However, by earnestly uniting and pooling our resources we can concretely correct our faults and increase our effectiveness.

In general it may be said that nurse anesthetists as a whole desire that the number of medical anesthesiologists should increase. These anesthesiologists can be a source of strength to the anesthesia service and to us. In many instances it is desirable that at least in the large hospitals a medical anesthetist should head the anesthesia department. We look to him for experience and guidance and for the friendship of a true fellow worker. Hundreds of us have worked together and have produced an excellent service. This I know from personal experience. In some instances the nurse anesthetists may have acted in an unco-operative manner. However, the greater number not only have co-operated but have taught, aided, and abetted the medical anesthesiologist, only to find themselves betrayed. We nurse anesthetists beg of him that he refrain from belittling a group that has proved itself, a group that, long before the physician considered it important enough for his attention, made the giving of anesthetics an art and a career. We beg that the medical anesthesiologist refrain from constantly, and in public, taking potshots with the ammunition of unfairness and untruth at a group that he knows, if he is perfectly

honest, does work essentially as good as his. Admittedly, not all nurse anesthetists are as good as some medical anesthesiologists, but not all medical anesthesiologists are as good as some nurse anesthetists.

Let us not call a truce. Let us make peace, that some plan for effective and progressive anesthesia service may result.

The nurse anesthetist as well as the medical anesthesiologist should encourage others to enter this field. Instead of belittling the career as one of constant self sacrifice and persecution, let us speak more of the great satisfaction of service it gives. Let the anesthetist realize that it *is* a demanding service that has been voluntarily chosen and go on from there. Let us not only encourage nurses to take up this work but aid those physicians who have the courage and the will to become the "unsung heroes" of the surgical team.

It is true that there is little that the surgeon can do to increase our numbers. However, he can, by being a little more one of a team and a little less of a god, encourage able and brilliant men to enter the field of anesthesia. By being a little less inclined to overlook the anesthetist, except when blame is to be placed, he can also give dignity to the position of the nurse anesthetist and thus encourage able and brilliant nurses to enter this field that is directly responsible for the vast advance in surgery as we know it today. He should realize that it is the skill of these anesthetists that in great part has made it possible for him to receive recognition for his remarkable operations.

The hospitals are constantly calling for more anesthetists, both medical and nurse anesthetists. But they do nothing to encourage either to enter this service. The anesthesia department is almost always the stepchild of the other departments. Funds for its proper maintenance receive consideration only after all other budgets are satisfied. In almost every instance, except in the large hospitals, the personnel on the anesthesia service are expected to work without question at all hours and under all circumstances. No provisions are made for the anesthesia staff to attend meetings and conventions. It is difficult for the anesthetist to attend the funeral of a member of his own family. Holidays. . .what are they? And here I condemn the surgeon who thinks it is smart to bring in a patient for an "emergency" hysterectomy or correction of congenital dislocation of the hip on a holiday. Anesthesia is a difficult service to cover, for the call is for twenty-four hours. In most hospitals the night call is covered by the same anesthetists who serve during the day. Hospital administrators bemoan the fact that the salaries are too high. I say the compensation in most instances is too little for the services demanded or needed. The hospital administrator will say that the salary scale is higher than that for other departments. However, what other department is called upon to spend the hours and provide the nerve-racking service required? The hospital administrator should remember that anesthesia is a special service that cannot be properly provided by hit-or-miss personnel. He should remember that in many of the small hospitals the anesthetist,

physician or nurse, is expected to fill in, in any emergency that arises. If he will carefully look over all the departments, he will find that the anesthesia department is one in which there is the highest sense of service. That in itself is worthy not only of monetary but of personal consideration.

The hospital administrator is also constantly appealing to us to increase the output of graduate anesthetists. Where? And with what? Some hospitals do attempt to establish schools of anesthesia, but how many do so with an honest desire to produce good anesthetists for the service? Very few. The chief desire of many hospitals is to get student anesthetists to lessen the cost of the anesthesia service. How many of the hospitals maintaining schools of anesthesia provide adequate teaching personnel, equipment, and living quarters for the student anesthetists? How many of these hospitals are willing to furnish adequate libraries and rooms for study and classes? How many hospitals encourage either medical or nurse anesthetists to become competent teachers by paying adequate salaries to those who do this difficult work? One can almost count them on one hand. This is proof in itself that the hospital administrator apparently is co-operative, while actually he is not.

It is admitted that only hospitals with large admissions, to give students adequate clinical experience, can or should conduct schools of anesthesia. It is admitted that a school of anesthesia is a responsibility. However, schools of anesthesia should not be considered as a means of saving money but as a source of supply of personnel for a vital service.

It would seem to me that the discussions of this panel should be such as to lead to a solution as to how we, as a group, with an unselfish desire to work together, may find some practical plan for furnishing not only adequate but efficient personnel for anesthesia service.

From the Viewpoint of the Medical Anesthesiologist

Donald E. Hale, M.D.*
Cleveland

The standards of anesthesia service today have a very different aspect from those of one hundred years ago. The practice of anesthesia, after its discovery, consisted in putting a patient into an unconscious state so that he could not feel the pain of an operation. This early anesthesia was not concerned with such problems as the patient's ability to undergo anesthesia, fluid balance, and muscular relaxation. The preanesthesia study of the patient, the use of premedication, and the knowledge of the consequences of anesthesia neces-

*Anesthesiologist, Cleveland Clinic Hospital.

sarily had to follow the original discovery. The tremendous fund of knowledge that has been built up and assembled in the specialty of anesthesiology not only has made anesthesia safer for the patient but has been able to satisfy the special requirements of different operations and of different surgeons. Anesthesia is no longer a matter of pain elimination and loss of consciousness alone. The anesthetist today has not the slightest trouble in putting a patient to sleep, but he may encounter difficulty in making that sleep safe for the patient and in assuring a complete recovery from the effects of whatever agents or methods are employed.

Research in anesthesia has had many facets and has extended into many adjacent fields. Modern anesthesia apparatus is the result of many painstaking experiments. Complicated as it seems, the modern gas machine is an ingenious assemblage of devices, each of which, although more or less complex in itself, simplifies the giving of safe anesthesia. Research into the cause and prevention of explosions has made this type of accident less common, although much is left to be explored in this field. Careful analysis of the results of the use of different agents in producing anesthesia has resulted in a uniformly high quality in these substances with increasing safety to the life of the patient. Laboratory experimentation with new agents and methods has provided ever widening possibilities in supplying safe and adequate anesthesia. It has been necessary for research in anesthesia to keep pace with research in surgery, and many advances in anesthesia have made possible operative procedures that could not have otherwise been attempted. Noteworthy among these is the employment of intratracheal anesthesia during thoracotomy.

The anesthesiologist is concerned with many things besides the administration of the anesthesia. Nevertheless, it should be stressed that during anesthesia the conduct of the anesthesia itself should take precedence over everything else. Although the keeping of an accurate anesthesia record is important, it should not be kept at the expense of careful second-to-second observation of the essential physiologic processes of the patient. Thus an anesthetist should not leave the patient to start an intravenous infusion, to investigate one that is not running properly, or to serve as a circulating nurse, but he should have one hand upon the pulse and the other upon the apparatus that is providing the anesthesia so that the earliest changes in the patient's pulse, blood pressure, respiration, or color may be detected and appropriately compensated for by changes in the management of the procedure. Under many circumstances two or more anesthetists are needed, one to administer the anesthesia and follow changes in pulse, blood pressure, and respiration, and the other to supervise estimation of blood loss, preservation of fluid balance, and the like.

The anesthesiologist's knowledge of surgery must be such that he can appreciate the hazards and dangers of the operation, assess the patient's ability to withstand it, and select and administer an appropriate agent. This selection

must provide the utmost in safety and at the same time fulfil the requirements of the individual surgeon. Many problems associated with the operation and the anesthesia can be assumed by the anesthesiologist, the surgeon thus being allowed to concentrate fully upon the surgical problem. These problems include frequent reassessment of the patient's condition during the progress of the procedure, suggestions as to the need for temporary suspension of the operation to allow recovery from the effects of traction reflexes, and decisions as to the need for blood or one of its substitutes.

The plan of anesthesia management should be started when surgery is decided upon. The plan may be started upon the patient's first visit to the surgeon or upon his entrance into the hospital for a few days' preparation before surgery. The preparation of such a patient deals with the blood volume, the hemoglobin, and the proteins. The circulation deserves careful consideration. Cardiac decompensation must be treated by rest in bed and by digitalization if necessary. A careful evaluation of the respiratory system will indicate whether inhalation anesthesia will be well tolerated. Special spirometric tests are indicated if pneumonectomy is proposed in order to be certain that the other lung has sufficient capacity to sustain life on a 20 per cent oxygen atmosphere. The functions of damaged liver, kidneys, or organs of internal secretion must be known.

Next after the original planning for the operation and anesthesia is the immediate preoperative evaluation. Upon this occasion the history and physical examination should be reviewed and supplemented where necessary, the laboratory data should be scanned, and omissions in the physical examination, history, and laboratory studies should be detected and rectified. The proper selection of agent and method depends upon this careful survey of the condition of the patient. At this time also premedication is selected, and it may be decided that basal anesthesia should be substituted for or added to it.

During operation and anesthesia one of the chief concerns of the anesthetist is that oxygen reach the body cells in order to maintain adequate metabolism. Metabolism is diminished in all cells with which anesthetic agents come into contact. To sustain adequate metabolism, therefore, at least the usual quantities of oxygen must be delivered to the cells, particularly those of the vital centers, of the myocardium, and of the conduction system of the heart. This delivery of oxygen to the cells requires that sufficient quantities of an atmosphere of optimal oxygen concentration be delivered to the functioning alveolar epithelium. Blood in proper volume, containing adequate amounts of functioning hemoglobin, must circulate under safe pressures. The cells must not be so deeply anesthetized that they cannot utilize oxygen.

The anesthesiologist has developed means and devices for accomplishing these ends through years of laboratory and clinical research. The intratracheal catheter and bronchoscopic aspiration guarantee a free airway. Manual or mechanical pulmonary venti-

lation by any one of several devices provides adequate gaseous exchange under circumstances of lowered vital capacity or centrally depressed respiration. Blood banks assure blood in sufficient quantity, and oxygen-carrying capacity of the blood is assured by proper tests and by replacement with intravenous, intramedullary, or intra-arterial infusion under pressure when indicated. The estimation of blood loss by weight or hemoglobinometry is of value in preserving blood volume. Blood pressure is maintained by the replacement of blood and by the injection of one of the vasopressors, many of which have been thoroughly evaluated by practicing anesthesiologists.

The anesthesiologist must be keenly aware of the many complications that may follow the use of certain anesthetic agents or methods and of those that may be brought about by the position of the patient during the operation. The effect of the various positions upon the vital capacity and upon the return of blood to the heart, which in turn determines the cardiac output, must be known, and frequently a compromise must be made between the position that is ideal for the surgeon and the position that is ideal for the welfare of the patient.

The use of certain instruments of precision during complicated operations is enjoying increasing vogue. Thus continuous recording of the electrocardiogram or recordings of the pulse, blood pressure, and respiration together with respiratory volume may yield information that will increase the safety of a procedure.

Protection against the temporary loss of blood into anesthetized extremities may be afforded by wrapping the extremities in elastic bandages or by the employment of some form of the G suit.

The serious complication of cardiac arrest must be well known to the anesthesiologist so that the earliest signs of possible impending cardiac arrest may be recognized and appropriate steps taken to prevent it. In addition, when this complication does occur, the anesthesiologist must be completely familiar with the modern methods of treatment including cardiac massage and defibrillation. Various agents, such as adrenalin, procaine, atropine, and ouabain, that are valuable in the prevention and treatment of this complication must be used with care and understanding when indicated.

There are certain services in addition to those of operating room anesthesia that the medical anesthesiologist provides. Among these are the diagnosis and treatment of pain, the employment of nerve block, the administration of inhalation therapy, the operation of the blood bank, the performance of bronchoscopy, and consultations.

Pain presents a problem that is of interest to the anesthesiologist as well as to the neurosurgeon and clinician. Working with these specialists the anesthesiologist may be able to aid in the diagnosis of pain and to prognosticate its course and then either to alleviate it altogether or to modify its severity. A thorough familiarity with the various analgesics, the use of procaine and alcohol intravenously, and the employment of various blocks is of the utmost importance.

Nerve blocks for anesthesia, diagnosis, and prognosis constitute an important part of the field of anesthesiology. These blocks include the interrupting of nerve impulses, both afferent and efferent, for short or longer periods with proper evaluation of the results. Simple agents, such as procaine or metycaine, are used for the temporary interruption of these pathways, and other agents in oil for longer interruption. Ammonium sulfate preparations are used for still longer interruption, and absolute alcohol for destruction of nerve tissue.

In the field of inhalation therapy the anesthesiologist is frequently depended upon to decide whether or not oxygen should be administered to a patient. It is probably true that oxygen is administered to many patients to whom it cannot be expected to bring any benefit. On the other hand, there are many patients who derive much benefit from the administration of oxygen provided it is given by an appropriate method and in the proper concentration. Under certain circumstances apparent oxygen lack is due to deficiencies in the respiratory or the circulatory system, and increasing the concentration of inspired oxygen produces less than the expected benefit. The use of pressure in the administration of oxygen in conditions other than respiratory arrest may have some value, although this subject is still under investigation. The use of carbon dioxide in order to stimulate respiration postoperatively still has some value, although an appropriate means of relieving pain that interferes with a deep respiration may be more effective. The use of helium mixed with oxygen for certain constrictive respiratory tract conditions may prolong the life or add to the comfort of the patient.

The blood bank is occasionally managed by the anesthesiologist. He naturally has a keen interest in this department inasmuch as he uses a great deal of blood during operations. The bank provides an adequate supply of blood of all the different types, including Rh negative blood, properly matched. The anesthesiologist must be familiar with the recognition of signs of and prevention of reaction to blood infusion, especially under anesthesia.

Aspiration bronchoscopy not only at the conclusion of operation but in the patient's room after an operation may be accomplished to good advantage by the medical anesthesiologist.

The medical anesthesiologist should be available as a consultant when decisions are made relative to how a patient should be prepared for operation, what anesthesia should be selected, and what precautions must be taken before, during, and after the operation from the standpoint of anesthesia in order to achieve a satisfactory result.

The medical anesthesiologist is subject to considerable stress and strain in the course of the execution of his daily duties. He should be a diplomat of the highest order, skilled in the art of the soft answer but firm in his decisions that concern the safety of the patient. He must not be persuaded to give just a whiff of gas to a patient with a full stomach or to ignore the lack of proper physical and laboratory examination.

From the Viewpoint of the Surgeon

Adolph A. Walkling, M.D.*
Philadelphia

A medical anesthesiologist at the head of the department of anesthesia in every hospital would be ideal. This is now impossible, mainly because of insufficient numbers of trained men.

The surgeon should have at the anesthetist's position at the operating table someone with a knowledge of the uses and contraindications to the use of the various anesthetic agents and combinations. While a surgeon may have sufficient knowledge of anesthesia to be able to determine the type or combination of anesthetic agents to be given in each case, he can neither give the anesthetic nor supervise its administration properly in a difficult or prolonged surgical procedure. It is careful attention to detail and to the treatment of minor difficulties as they occur that makes for safe anesthesia, and these are precisely the conditions that the surgeon is least apt to appreciate. The surgeon is relieved of this burden if a properly trained anesthesiologist is given the responsibility of choosing and administering the anesthetic agent. It is impracticable in most institutions to employ a sufficient number of medical anesthesiologists to administer every anesthesia. It therefore becomes necessary for institutions to employ nurse anesthetists or anesthesia technicians such as were used in the Army and Navy during World War II. If it is necessary to employ anesthetists not well trained in physiology and pharmacology, it also becomes necessary that a physician anesthetist or a member of the medical or surgical staff who is well trained in anesthesia problems be immediately available. The surgical residents in some large hospitals have instruction and practice in the use of unusual appliances, such as the Mautz and Crafoord machines, and in the administration of the unusual types of anesthetic agents. This helps considerably in the absence of a medical anesthesiologist. It is often difficult for the nurse anesthetist or the anesthesia technician to institute specific treatment promptly in many serious complications, owing to a lack of fundamental knowledge of disease processes. The nurse anesthetist should not be compared with the medical anesthesiologist or expected to replace him. The properly trained nurse anesthetist, with proper supervision and co-operation from the head of the anesthesia service, can be a valuable addition to it. The

*Associate Professor of Surgery, Jefferson Medical College; Staff Surgeon to the Pennsylvania Hospital and the Benjamin Franklin Clinic of the Pennsylvania Hospital.

tendency is to expect too much of the graduate nurse undergoing training in anesthesia. More time should be spent during this training period on instruction in the common forms of anesthesia and the care of patients. We cannot expect all nurse anesthetists to be expert anesthesiologists and to have the same degree of skill in anesthesia as we expect from the physician anesthetists. There can be co-operation and teamwork to the satisfaction of both and for the good of the patient, the hospital, and the surgeon.

A physician anesthetist trained in medicine, physiology, and the new forms of anesthesia is best qualified to advise and to supervise administration of the anesthetic selected for the individual patient as well as to be consulted regarding preoperative and postoperative care. Teamwork between the anesthesia staff and surgical staff is one of the most precious assets of a surgical service. The anesthesiologist should sufficiently examine the patient and his history so that an intelligent choice of anesthetic agent is made. The selection of drugs for preanesthetic medication should be based upon the physiologic disturbances of the patient and the effects of the therapy on these disturbances. Consideration must also be given to the disturbances that may be anticipated as a result of the therapy, the operation, and the anesthesia. A certain routine should be established, but there should not be the same routine preanesthetic medication for all patients before all anesthetic agents, which is the tendency when no medical anesthesiologist is available.

The surgeon must be the responsible head of the operating room team. He is held responsible by law and by the patient's relatives, and therefore he should have the last word, whether it be in the choice of the anesthetic agent or in certain aspects of the medication necessary. The surgeon may not always agree with the anesthetist under these circumstances, but with a spirit of co-operation these differences can always be settled. The need for a spirit of co-operation between the anesthetist and the surgeon cannot be too strongly stressed. Owing to insufficient numbers of trained anesthetists, surgeons are sometimes confronted with a young man who is well trained in the science of anesthesiology, but who is not mature enough in other aspects of physician-to-physician or physician-to-patient relationships. Disagreements have been known to be insoluble and settled only by separation. Surgeons and anesthesiologists can and should submerge their petty differences for the benefit of all concerned.

Some anesthetists tend to use combinations of anesthetic agents in what Beecher has called "shotgun anesthesia." The surgeon usually has no objection to the use of various combinations provided the indications are specific. The disasters that may accompany the use of combinations may result from the toxic effects of more than one agent. This may lead to difficulty in the early recognition and treatment of complications. Many new and powerful drugs can be invaluable to the comfort and safety of the patient and the convenience of the surgeon, but they may become lethal weapons

when used injudiciously. Every anesthetic agent is lethal, and the simplest to administer is often the most dangerous. It seems fitting that in an article by Lundy,[1] immediately after a long paragraph on combinations of anesthetic agents and the danger in their use, he stated: "We ought not to forget that the anesthesiologist's understanding and actual use of stimulants and supportive measures are hardly less important than the method of anesthesia employed."

The anesthetist should accompany the patient from his room or introduce himself when the patient arrives at the anesthesia room. It should be the anesthesiologist's job to supervise the administration of blood and electrolytes during the operative procedure. The same is true if it be a well trained nurse anesthetist; otherwise, the surgeon or an assistant must assume that responsibility. No one should be allowed to administer an anesthetic unless skilled in intubation. Every surgeon, resident, and intern should have experience in this frequently life-saving procedure. This is something that interns can be taught on the anesthesia service. I am of the opinion that intubation under local anesthesia is safest. Surgeons sometimes become impatient when induction is difficult. It is wiser to delay the operation than to begin before the patient is ready. The anesthetist should have the final word here. The surgeon will "save time by waiting early."

The anesthetist should see to it that the patient is returned safely to his bed after the operation and that intravenous medication, if required, is being administered. He must stay with the patient until proper nursing care is provided. He should see to it that the necessary equipment for emergencies is available. At the Pennsylvania Hospital we are blessed with a recovery ward of twenty-four beds in eight cubicles. It is equipped with adequate apparatus to handle emergencies and a sufficient number of nurses to care for the patient in the immediate postanesthesia period. A patient remains in the recovery ward under the combined supervision of the anesthesia staff and the surgical staff until he has recovered sufficiently for emergency measures not to be needed. Nowhere else is co-operation between the surgical staff and the anesthesia staff better demonstrated for the benefit of all concerned. In the recovery ward there is rapid and definite treatment of all emergencies. This arrangement has saved a good many lives in the past twenty-five years of the ward's existence. Ideally, the ward should be on the operating room floor. There is an obvious economic advantage to the hospital once such a ward is established.

The anesthetist has the responsibility of providing extra care to patients of advanced age undergoing anesthesia. The surgeon has the responsibility of not prolonging the operative procedure unnecessarily, as the morbidity and mortality rates are higher when the operating time is longer than one hour. New anesthetic agents and improved administration by trained physician anesthetists make difficult operations safer.

1. Lundy, John S.: Advances in anesthesia. Surgery **24**: 995-998, Dec. 1948.

It often happens that a surgical emergency must, of necessity, be cared for by someone other than the chief surgeon. It is true also that, of necessity, someone other than the chief anesthesiologist is present. However, a definite schedule should be arranged so that the patient is not deprived of competent service. Surgical emergencies should be evaluated before operation by the anesthetist. A study of the patient's history and the results of physical and laboratory examinations is essential. An emergency operation should not be allowed to interfere with the anesthetist's utilization of a competent technic.

The education and training of the anesthetist are the most important safeguards in preventing accidents, because anesthesia accidents are more likely to result from ignorance and negligence than from pure mischance. The anesthetist must be acquainted with the physiology of respiration and circulation, so that he can recognze variations from the patient's normal and know immediately the proper measures to keep these vital functions within the range that assures a safe outcome.

Surgeons are sometimes lax in arranging anesthesia for so-called "minor operations." The anesthetist must realize that there is no such thing as a "minor anesthesia" and so conduct the case. Statistics indicate that at least half of the anesthesia deaths in the United States occur in children being subjected to so-called minor procedures.

The subject of fees and salaries is an extremely delicate one. The private, semiprivate, and the wholly charitable hospital have different problems and different solutions. These problems can only be solved by the hospital, the surgical staff, and the anesthesiologist in each instance.

An ideal anesthesia service from the surgeon's standpoint should have a medical anesthesiologist as chief. There should be a sufficient number of assistants, either physicians or well trained and well supervised residents or nurses. These anesthetists should have (1) a thorough knowledge of all anesthetic agents, appliances, and methods of administration and a sufficient knowledge of disease processes to be able to advise on any combination of anesthetic agents as needed and (2) a sufficient knowledge of pharmacology and physiology to administer preoperative medication intelligently and advantageously and to supervise intelligently the administration of fluids needed during the operation and in certain instances during the immediate postoperative period.

The hazards of surgery and anesthesia will be immeasurably reduced with co-operation and teamwork among the hospital, the anesthetist, and the surgeon.

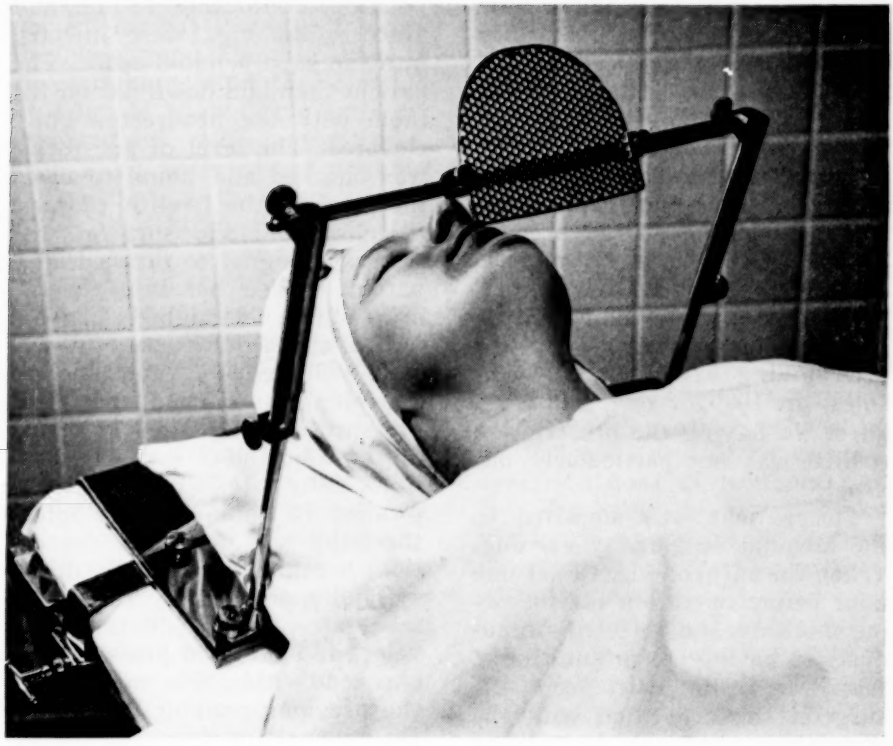
NOTES

Case reports are the foundation of the medical literature. Their brevity makes them interesting to write and assures their being read. There is a place in this section of Notes for case reports as well as for descriptions of gadgets and special technics. Send in your contribution now. Other anesthetists will be helped by it.

Protective Device for Anesthesia Mask.—This device was designed for use in surgery and in administering anesthetics, particularly in eye, ear, and other head surgery. The apparatus has a wide range of adjustment to meet particular conditions and to facilitate the work. It is adjustable to any size or height by simple manipulation of thumb screws.

The small face screen of perforated metal prevents the surgical drapes from covering the patient's face and also serves as a protective device for the anesthesia mask.

The mental base is heavy enough to be self retaining and does not necessarily need the sidebraces fastened to the operating table.—Josephine E. Krewson, R.N., Muskegon, Mich.



POSTOPERATIVE COMA AND DEATH FROM BARBITURATE INTOXICATION. —A pregnant woman, unipara, aged 20, had an unusual psychologic background. At birth she suffered a head injury resulting in hyperthermia that lasted for five days. Although she apparently recovered from the birth injury from the standpoint of physical findings, a peculiar behavior pattern developed during adolescence. The patient indulged in petty thievery from relatives and friends, forged checks, and consequently became involved with the police. Disciplinary action was withheld on the strength of her promise to refrain from further antisocial activity. Although she was not normal in her behavior pattern, she was not considered mentally deficient in the usual interpretation of the term.

During her second pregnancy she repeatedly visited her physician to whom she complained of abdominal cramps, hemorrhage, rupture of membranes, and nausea and vomiting. Because she would insist that she be admitted to the hospital, she was hospitalized five times during the last six months of her pregnancy. Her condition was so difficult to evaluate that she received particular consideration in the physician's effort to avoid overlooking anything that might jeopardize her life or that of the baby. However, the course of the pregnancy was entirely normal and uneventful.

Elective cesarean section was

scheduled two weeks before term inasmuch as the first pregnancy had resulted in delivery by the abdominal route. The Saturday evening before the operation, which was scheduled for Monday morning, the patient visited her physician with the request for more "sleeping capsules" because of her inability to sleep and her nervous state. Since she had complained of so many things during the pregnancy, the physician had been giving her nembutal capsules, gr. 1½, for rest, and a request for having the prescription refilled was not particularly unusual.

The patient was admitted to the hospital on Sunday evening. When the surgeon visited her one hour before operation the following morning, she objected strenuously to having spinal anesthesia. However, on the insistence of the surgeon she consented with the stipulation that she be put to sleep as soon as possible after the baby was delivered.

At 9:00 a.m. the anesthetist called for the patient on the ward. She was co-operative and moved onto the litter without assistance but only after being asked twice. Since premedication for patients undergoing cesarean section is only nembutal, gr. 1½, it is not common to have to rouse the patient or to speak loudly in order to instruct her in moving onto the litter. After arriving at the operating room she moved herself onto the operating table unassisted but refused to assume the position for spinal puncture. The nurse who was positioning her had to shake her and speak forcefully before she became co-operative.

Spinal puncture was performed with the patient in the sitting position. Pontocaine, 16 mg., and glucose, 100 mg., were injected into the subarachnoid space. The patient then laid down flat on the table with the headrest slightly elevated. The level of anesthesia was checked and found to be at the level of the twelfth thoracic vertebra, and the surgeon was given the signal to proceed. The patient moved her arms in the armrests and sighed heavily. When asked how she felt, she said, "All right." At the time the abdomen was opened, the blood pressure reading was 120 mm. Hg systolic and 60 mm. Hg diastolic; pulse rate 76 a minute; respiration 16 a minute. Just before the baby was delivered, the patient became exceptionally drowsy, and soon a glassy stare with moderate pupillary dilatation developed. The blood pressure was checked within five minutes of the previous reading because of the unusual appearance of the patient's face and eyes and was found to be 60 mm. Hg systolic and faint. No radial pulse could be palpated and only a faint carotid pulse. In a matter of seconds respiration also ceased, and the patient made no voluntary effort to breathe. During this time the surgeon delivered a normal female infant, who cried lustily and showed no evidence whatsoever of central nervous system depression.

Oxygen and manual pulmonary ventilation were administered to the mother with only slight benefit. The surgeon, having been notified of the cardiac and respiratory irregularities, was asked to delay closure of the abdomen until the crisis had been met. When the patient failed to respond to the administration of oxygen under pressure and fluids

intravenously, the surgeon performed cardiac massage through the diaphragm. Within five to seven minutes after the injection of 1 cc. of epinephrine into the myocardium and cardiac massage, along with manual pulmonary ventilation, the heart resumed beating. During this hazardous period cyanosis was not pronounced, and the blood had only a dusky tinge. After resumption of cardiac activity the blood pressure increased to 170 mm. Hg systolic and 80 mm. Hg diastolic, and the pulse rate was 116 a minute. Respiratory rate was only 1 a minute. The pulse was regular, and general cardiac activity was good. Respiration, however, remained slow, not more than 6 a minute, and the patient was unable to ventilate herself adequately without assistance. After the operation was completed, it was necessary to keep the patient in the operating room until respiration improved sufficiently to warrant discontinuing manual assistance. To increase the respiratory rate and volume, 1 cc. picrotoxin was administered and proved effective.

The attending physician, who was the surgical assistant, was questioned regarding the use of opiates by the patient. He replied that the patient had never been given an opiate but had been receiving nembutal in moderate doses for the past six months.

Just as the patient was to be returned to her room, the nurse on the ward entered the operating room with an empty box that she had found in the patient's bed. The box had contained the nembutal that the patient had requested from her physician. It was never determined how much barbituric acid she had taken, but it was computed to have been 15 to 36 gr. immediately prior to operation.

The lack of depression in the baby may be assigned to the fact that the patient's metabolic activity had been slowed by the preoperative dose of nembutal, gr. $1\frac{1}{2}$. The baby was also delivered within ten minutes of the time the symptoms of depression appeared in the mother.

Postoperatively emphysema developed, and the patient secreted large amounts of mucus. Although no cardiac or respiratory depression was evident, the patient failed to regain consciousness and died on the fourth day postoperatively.

The question arose as to whether the patient would have suffered irreparable cerebral damage if she had not had a birth injury with accompanying hyperthermia. The degree of cyanosis was not particularly severe, and many patients are subjected to hypoxic states no worse than this patient experienced without apparent ill effect.—PHYLLIS A. ROBERTS, R.N., Jefferson, Iowa.

EIGHTEENTH ANNUAL MEETING
OF THE
AMERICAN ASSOCIATION OF NURSE ANESTHETISTS
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ST. LOUIS

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Requests for applications for hotel reservations will be accepted after February 1, 1951. Send request to American Association of Nurse Anesthetists, 116 S. Michigan Ave., Chicago 3, Ill. Early application is urged because of anticipated record attendance.

LEGISLATION

Emanuel L. Hayt, LL.B.*

Private Hospital Discharged of Liability for Injury to Patient Receiving Medical Care from Nurse.—A private hospital was held liable for the negligence of a nurse in its employ. The issue was whether a private hospital operated for profit is responsible for its nurses' negligent acts, not administrative or clerical, but performed in relation to a patient's medical care in connection with an operation performed in the hospital by the patient's own physician.

The patient was a paying patient in the hospital and had an anal fistula removed by the surgeon. During the operation the patient, who was under a general anesthetic, was severely burned by an electric plate, which was connected with and operated the electrocautery knife used by the operating surgeon. Before the operation the negative electric plate was prepared and applied under the patient's body by a regular nurse of the hospital.

The Appellate Division of the New York Supreme Court has just reversed the judgment against the hospital and has held that "Until the Court of Appeals expressly holds otherwise, we think we should follow the rule that a hospital, whether charitable or private, is immune from liability by reason of the negligence of a doctor or a nurse with respect to matters relating to the patient's medical care and attention." The case will now go to the State Court of Appeals for a final decision.

Professional Liability Insurance Rates Are Reduced.—The St. Paul-Mercury Indemnity Company, which offers professional liability insurance to the members of the A.A.N.A., has agreed to reduce the insurance premium from $20.00 to $10.00 per annum in view of the fact that similar coverage has been provided for the A.N.A.

Since this insurance has been in force for members of the A.A.N.A., it appears that only a few claims have been made and that no moneys have been paid out in settlement. About 350 members have availed themselves thus far of the insurance.

The agreement to reduce the rates for nurse anesthetists came about as a result of pressure brought on the company, to whom it was pointed out that it would be unfair to charge nurse anesthetists $20.00 whereas other nurses who are members of the A.N.A. would be paying only $10.00. The company agreed with the justice of our position.

The thirteenth qualifying examination for membership in the American Association of Nurse Anesthetists will be conducted on Saturday, May 26, 1951.

The deadline for completed applications, including transcripts, is April 23. As of February 1, 1951, applications and other correspondence pertaining to the qualifying examination should be addressed to the new address of the A.A.N.A. Executive Office, 116 S. Michigan Ave., Chicago 3, Ill.

*Counsel for A.A.N.A.

Bakal v. University Heights Sanitarium, Inc., App. Div. 1st Dept., N.Y.L.J. December 26, 1950, front page.

ABSTRACTS

Guyton, A. C., and Reeder, R. C.: Quantitative studies on the autonomic actions of curare. J. Pharmacol. & Exper. Therap. **98**:188-193, Feb. 1950.

"Though it has long been known that curare exerts profound effects on many of the autonomic functions of the body, it is still uncertain how important these effects are in the clinical use of the drug. . . .A detailed quantitative study of the action of curare at the myoneural junction, using the gastrocnemius muscle as a standard, has been made, and the doses of curare necessary to cause autonomic paralysis are compared with these previous results for skeletal nerve endings. . . .Medium sized dogs lightly anesthetized with sodium pentobarbital were used in these experiments. . . .To paralyze completely two parasympathetic functions, 1.5 times as much curare was required as that necessary to cause skeletal nerve paralysis. To paralyze completely three sympathetic functions, five to ten times as much curare as that necessary to cause skeletal nerve paralysis was required. The duration of any degree of paralysis after totally paralyzing doses of curare was an average of 22 minutes for the superior cervical ganglion and 20 minutes for the ciliary ganglion. After both the ciliary and the superior cervical ganglia were totally paralyzed, stimulation of the postganglionic fibers still produced maximal contraction of the iris and nictitating membrane, respectively. A moderate depressor effect on blood pressure was invariably found in the use of curare, and after sudden intravenous injection of paralyzing doses of curare, several animals immediately went into shock. Curare was found to cause a mild increase in blood flow where it was given in small doses, but there was usually a decrease in blood flow to considerably below normal as the dose reached paralyzing levels."

Atanackovic, D., and Dalgaard-Mikkelsen, S. V.: Procaine and autonomic innervation. Proc. Soc. Exper. Biol. & Med. **74**:55-56, May 1950.

"Experiments have been performed on 24 dogs anaesthetized with chloralosane to investigate the mechanism of action of procaine on autonomic innervation . . . .Procaine paralyzes first the parasympathetic and later the sympathetic synapses. Procaine suppresses the nicotinic and muscarinic effects of acetylcholine on the heart, but not the muscarinic effect of acetylcholine on the blood vessels. Procaine curarizes first the intercostal respiratory muscles, then the diaphragm and finally the skeletal muscles. Physostigmine, dimethylcarbamate of hydroxy-phenylbenzyl-trimethylammonium (Nu-683) or di-isopropylfluorophosphate (DFP) suppresses the paralyzing effects of procaine on synapses, on postsynaptic cardiac innervation and on neuro-muscular junctions, while procaine protects against most symptoms of intoxication induced by physostigmine, Nu-683 or DFP."

Basil, B.; Edge, N. D., and Somers, G. F.: The pharmacology of phenadoxone or dl-6-morpholino-4:4-diphenyl-heptan-3-one hydrochloride. Brit. J. Pharmacol. **5**: 125-141, March 1950.

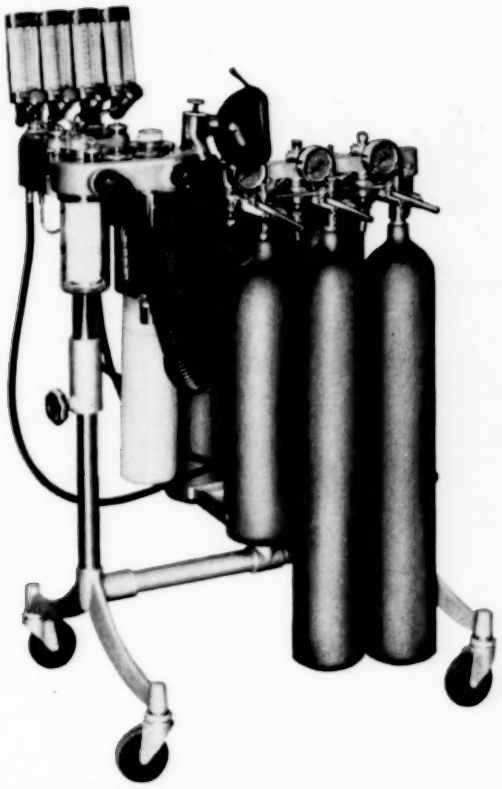
"Since the isolation of morphine by Serturner in 1816 the search for satisfactory substitutes has been long and intensive. . . . During the World War II German chemists discovered a new group of compounds with analgesic activity . . . .We find that the compound dl-6-morpholino-4:4-diphenyl-heptan-3-one hydrochloride (which differs from Hoechst 10581 in replacement of the hexane by the heptane chain) possesses a higher analgesic activity on rats than any other compound of this type hitherto described, and we have therefore investigated its pharmacological properties in some detail. . . .It is now available for use in the U.K. as a 'Schedule IV Poison' under the proprietary name of 'Heptalgin.' The non-proprietary name Phenadoxone has been approved for it. . . .It has been shown to be more active on rats than morphine, amidone, pethidine, or Hoechst 10581. . . .In spite of this high analgesic potency, it is less toxic to mice than amidone and compares favorably with morphine, 10581, and pethidine. Cardiac and circulatory effects in cats were slight, but a high dose given intravenously produced a strong depressant action on the respiratory centre. Respiratory depressant activity appeared to be related to the analgesic potency of these compounds. Like pethidine, amidone, and 10581, the drug had a weak spasmolytic action on smooth muscle. Tests for local anaesthetic action showed this to be only slight for CB11, but it has some surface analgesic action. . . .There was no evidence of tolerance developing in rats within three weeks."

Beecher, H. K., and Murphy, Anna J.: Acidosis during thoracic surgery. J. Thoracic Surg. **19**: 50-70, Jan. 1950.

"The blood gases, oxygen and carbon dioxide, the pH and the hematocrit value were measured before anesthesia and at intervals during surgery through the open pleura and in some instances on the day following operation. Forty-three patients were studied. All of them received nitrous oxide-oxygen-ether anesthesia. Of the two great problems, oxygen supply and carbon dioxide removal, it was found that the techniques employed were adequate to provide oxygen but not to remove carbon dioxide. This gas rises to dangerous tensions with the passage of time. Even though the actual carbon dioxide content does not increase the rise in tension is effected by a serious fall in pH. Various factors of possible importance in the rise of carbon dioxide tension are considered and discussed. The rise begins shortly after the patient is placed in the lateral position and before the pleura is opened. It continues with increasing rapidity. It is shown that ether anesthesia, the closed anesthesia apparatus, and the endotracheal tube are not responsible, for no such rise occurs when these same factors are present in patients in the supine position. . . .Further consideration should be given to what constitutes the optimum position for surgery in transthoracic procedures and to effective ways of assisting the respiration."

Kirby, D. B.: Use of curare in cataract surgery. Arch. Ophth. **43**:678-693, April 1950.

"The cataract surgeon is enabled to perform his task with greater delicacy and precision when the patient and his eyes are



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quiet and relaxed. Rigidity and muscular spasm may be the effect of apprehension, fear or worry, or they may be reflex to pain or discomfort. They are the source of many of the complications arising during the operation. . . .The only report of an ophthalmic operation performed with the aid of curare which I have found was that of an enucleation (Baird). No report of its use with local anesthesia in surgery of any kind was found. . . . The administration of curare has been found indicated if, after an adequate dose of sedatives and analgesics, and with the use of deep local anesthesia and palpebral akinesia, the patient still moves his eyes, still squeezes the fellow eye, thereby rolling upward the eye to be operated on, still has rigidity of the neck or skeletal muscles or still has respiratory neurosis. The effects of curare should be obtained, the peak determined and the level of safety established before the eye is incised. . . . Some hypertonic patients will not quiet down sufficiently to permit operation with local anesthesia. . . . My associates and I use thiopental sodium intravenously, not because we feel safe from a fatality with it, but because it is accepted and is the best one has at present. If anoxia is prevented and an experienced anesthetist is employed, thiopental anesthesia may be pleasing both to the surgeon and to the patient. . . . Those who wish to try the action of curare are advised to do so only with the aid of a skilled anesthetist, and not to incise the eye before the peak of the effect of the injection has passed, within three minutes after the injection is finished."

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Howarth, Frank: Studies with a radioactive spinal anaesthetic. Brit. J. Pharmacol. 4:333-347, Dec. 1949.

"The need for information about the fate of a spinal anaesthetic after its introduction into the spinal theca was early recognized. . . ,but many years elapsed before the problem was seriously studied by a number of workers . . . .In the main these workers agreed that after the intrathecal injection of procaine there was a rapid initial drop in local concentration with a subsequent period of gradual decrement. . . . It is proposed to describe a study of the fate of a spinal anaesthetic with special reference to its ultimate distribution among the tissues of the body and the routes by which it leaves the spinal theca . . . .A tracer technique seemed. . .to be indicated. . . .A radioactive spinal anaesthetic dibromoprocaine (DBP) hydrochloride has been prepared. . . .It has been shown that the concentration in the spinal subarachnoid space rapidly declines, associated with a rapid rise in urine concentration. The blood level remains persistently low. . . .After intrathecal injections only the spinal roots regularly show any capacity to concentrate the drug above the level existing in the cerebrospinal fluid at the site of injection. Of the tissues examined only kidney (and urine), liver (and bile) appear able to concentrate DBP above the circulating blood concentration. Large variations in time and dose did not produce large changes in the tissue/blood ratios. It has been shown that DBP enters the spinal cord during spinal anaesthesia, though it is improbable that it is able to produce a functional cord transection. Various routes of departure of this anaesthetic from the spinal theca have been studied, and, of these, that furnished by the venous system appears in the cat to be the most important."

Davison, M. H. A.: Pentamethonium iodide in anaesthesia. Lancet 1:252-253, Feb. 11, 1950.

"Pentamethonium iodide, also known as 'C5' and sold under the proprietary name of 'Antilusin'. . . was introduced to the medical profession as the antidote to decamethonium iodide. . . .Pentamethonium iodide has been used in hypertensive and normal people in the Royal Victoria Infirmary, Newcastle upon Tyne, as an adjuvant to anaesthesia, to reduce blood-pressure and therefore haemorrhage during such operations as sympathectomy, Millin's prostatectomy, and radical mastectomy. Anaesthesia was induced by inhalation of various agents, including nitrous oxide, ether, cyclopropane, and chloroform. In all the cases there was a severe fall of blood-pressure in 2½-5 minutes. The systolic pressure always fell to 80 mm. Hg or lower (lowest 50 mm. Hg). This effect was obtained with the patient horizontal or head down and with doses as small as 10 mg. . . .Besides its effects on the blood-pressure, pentamethonium iodide also dilates the pupil and relaxes the muscles. The relaxation of the muscles is unlike that obtained with curare. . . .Respiration may be irregular and inadequate, but is easily controlled by manual compression of the reservoir bag . . . .Pentamethonium iodide should only be used as an antidote to decamethonium iodide with the utmost circumspection."

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BOOK REVIEWS

THE FIRST ANESTHETIC. By Frank Kells Boland, M.D., Professor of Clinical Surgery, Emory University School of Medicine. Cloth. 160 pages. 21 illustrations. Athens, Ga.: University of Georgia Press, 1950. $3.00.

This book is not "another history" of anesthesia. It is a well documented presentation of the author's stated purpose: "Since the priority of Long's use of surgical anesthesia is now generally accepted, the present objective is to disprove the assertions of Welsh, Osler, and others that Long's accomplishment had no influence upon the historical development of our knowledge of anesthesia, and did not entitle him to 'Share in the introduction to the world at large of the blessings of this matchless discovery.'"

A brief résumé of previous attempts to produce surgical anesthesia serves as an introduction to the story of Crawford Long's activities in the use of ether. The "ether controversy" is presented with accounts of the part taken by each participant.

An interesting section of the book presents some evidence to support the hypothesis that Jackson may have known of Long's work before Jackson suggested the use of ether to Morton. Several means are outlined by which Jackson could have become acquainted with Long's use of ether. In addition to presenting evidence to support the belief that Jackson had the opportunity of knowing of Long's work, the author recounts Jackson's record of having attempted to claim the great discoveries of the Morse telegraph, guncotton, as well as of ether and by deceitful means to obtain Alexis St. Martin from Dr. William Beaumont. Boland then reasons that Jackson's conviction of the success of ether, before Morton had used it for surgical anesthesia, supports the thesis that Jackson could have known of Long's success.

One cannot finish reading this book without the wish that the work had been expanded to give more space to the story of Crawford W. Long as a man. Although the author has presented convincing, although at times inconclusive, evidence of Long's claim to fame, only brief glimpses into his life are afforded the reader.

An appendix contains facsimiles of letters and documents used in substantiating the claims in Long's behalf. A list of references and a bibliography complete the book.

WANTED: Nurse anesthetists. 250 bed hospital; seven nurse anesthetists. Department under medical supervision. Attractive salary, no maintenance. Majority of surgical work performed during the morning hours; small amount of emergency work. For particulars write: Anesthesiologist, Scott & White Memorial Hospitals, Temple, Tex.

WANTED IMMEDIATELY: NURSE ANESTHETISTS for 700 bed general hospital. Pleasant working conditions. Salary open. Complete maintenance. Liberal employee benefits. Apply: Personnel Director, Grady Memorial Hospital, 36 Butler St., S. E., Atlanta, Ga.

CLASSIFIED ADVERTISEMENTS

Opportunity for NURSE ANESTHETIST in Hawaii. Apply to: Administrator, Kapiolani Maternity and Gynecological Hospital, Honolulu, T. H. Travel expense from West Coast advanced. Hospital situated ten minutes from Waikiki Beach and ten minutes from downtown Honolulu.

NURSE ANESTHETIST: For 116 bed general hospital. Expanding anesthesia department headed by anesthesiologist. Attractive working conditions. Modern equipment (Heidbrink). Month vacation with pay. Salary $330 gross. Living accommodations available. Apply: Personnel Officer, St. Luke's Hospital, St. Paul, Minn.

NURSE ANESTHETISTS (3) to work with anesthesiologist in 300 bed hospital. Salary open. Apply: Chief, Anesthesia Dept., The Mercer Hospital, Trenton, N. J.

NURSE ANESTHETIST for 237 bed general hospital. $300 per month and full maintenance in nurses home. Staff of two anesthetists; off alternate nights and weekends. Three weeks' paid vacation. State age and experience in application. Personnel Office, Brackenridge Hospital Austin, Texas.

ANESTHETIST for 150 bed general hospital. Quarters available; very liberal arrangements. Write: Superintendent, Glenville Hospital, Cleveland 8, Ohio.

WANTED IMMEDIATELY: Obstetrical nurse anesthetist. Department covered by three, with 2,000 deliveries per year. Apply: Henry Ford Hospital, Detroit, Mich.

NURSE ANESTHETIST: A.A.N.A. member and eligible for N. Y. State registration. 100 bed general hospital. Four other anesthetists. Salary dependent upon qualifications; one month vacation; two weeks' sick leave: overtime after forty hours. Alternate every fifth night and Sunday call. Apply: Mary Pearson, Supt., South Nassau Communities Hospital, Rockville Centre, N. Y.

WANTED: Nurse anesthetist. All new hospital building and equipment; 55 beds opening around March 1. Farming community of 30,000; 90 miles south of St. Louis. Mild disability no hindrance. Salary open. Perry County Memorial Hospital, Perryville, Mo.

WANTED: Nurse anesthetist for oral surgeon's office. Forty hour week. Annual vacation and sick leave. $350 monthly. Apply: D. Griffel, Room 302, 414 13th St., Oakland 12, Calif.

NURSE ANESTHETIST wanted for 170 bed general hospital doing general surgery and obstetrics in suburban Washington, D.C. Full time physician anesthesiologist in charge of department. Salary commensurate with ability and experience, plus complete maintenance. For further information and details contact Chief of Anesthesia, Alexandria Hospital, Alexandria, Va.

NURSE ANESTHETIST for obstetrical anesthesia. Alta Bates Hospital, Berkeley, Calif. Salary $275.00. Inquire Manager.

WANTED: Nurse anesthetist for a 235 bed general hospital. St. Thomas Hospital, Akron 10, Ohio.

ANESTHETIST, R.N.: Fully experienced for small general hospital; excellent salary; live in or out. Write: Mr. Herman R. Goldberg, Administrator, Northern Liberties Hospital, 7th and Brown Sts., Philadelphia 23, Pa.

NURSE ANESTHETIST WANTED to complete staff of five. 260 bed Ohio hospital doing obstetrical and surgical anesthesia. Salary $325 month plus complete maintenance. Apply: Box K-10, Journal A.A.N.A. 116 S. Michigan Ave., Chicago 3, Ill.

WANTED: Nurse anesthetist; general hospital; member American College of Surgeons. Staff four nurse anesthetists. Salary open. Apply: Administrator, St. Luke's Hospital, Fargo, N. Dak.

WANTED: Anesthetists, four: 450 bed teaching hospital. Department directed by medical anesthesiologist, staffed by medical resident personnel and four nurse anesthetists. Desirous of increasing staff to eight nurse anesthetists. College town. $300 per month with periodic increases. Full maintenance. Liberal vacation and sick leave. Apply: Personnel Director, Roper Hospital, Charleston, S. C.

WANTED: Anesthetist nurse for 205 bed hospital near St. Louis. Salary open. Apply to: Sister Administrator, St. Joseph's Hospital, Alton, Ill.

NURSE ANESTHETISTS: Urgently need two. Modern, well equipped, 100 bed hospital, employing only graduate staff; attractive location within forty minutes of San Francisco; five day week; excellent salary; maintenance available. Administrator, Alameda Hospital, Alameda, Calif.

WANTED: Two nurse anesthetists. Four weeks' vacation with pay. Fourteen days' sick leave. Six holidays. Excellent salary and maintenance. Apply: Administrator, The Williamsport Hospital, Williamsport, Pa.

WANTED IMMEDIATELY: Nurse anesthetists for 800 bed general hospital. Staff of two medical anesthesiologists and ten nurse anesthetists. Cash salary $343 monthly with merit increases. Vacation with pay. Accumulative sick leave. Reply: Director of Anesthesia Department, Medical College Hospital, Richmond, Va.

NURSE ANESTHETIST: Excellent opportunities during summer months and also permanent openings. Portland is a beautiful seacoast city with many lakes nearby. Two hours from Boston by train. Apply: Personnel Department, Maine General Hospital, Portland, Maine.

NURSE ANESTHETISTS: 160 bed general hospital, employing two nurse anesthetists. Salary $350. Two weeks' annual vacation; accumulative sick leave. Housing and meals offered at minimum charge. Apply: Mrs. Ruth Garland, R.N., Superintendent of Nurses, Memorial Hospital, Natrona County, Casper, Wyo.

WANTED: Experienced nurse anesthetists. Cash salary $320; 40 hour week; overtime paid. 240 bed hospital. Maternity and general service. Sick leave and vacation with pay, also additional six national holidays paid. Apply: Superintendent, Woman's Hospital, 432 E. Hancock Ave., Detroit 1, Mich.

WANTED: Nurse anesthetist for 250 bed hospital. Five anesthetists employed. Apply: Thelma Dorum, Illinois Masonic Hospital, Chicago, Ill.

ANESTHETIST NURSE: One hundred bed hospital; Southern city of 125,000; salary $300 per month plus full maintenance; extra pay for night calls on case basis. Apply: Administrator, Highland Hospital, Shreveport, La.

NURSE ANESTHETIST for 80 bed hospital. Closed staff of doctors, all board men; mostly orthopedic cases. Salary open. Will furnish meals and laundry of uniforms. Contact C. E. Babcock, Director, Bone and Joint Hospital, Oklahoma City, Okla.

WANTED: Anesthetist. General hospital. Salary open. State experience. Sick leave and vacation. Apply: St. John's Hospital, Island Park, Fargo, N. Dak.

NURSE ANESTHETISTS for 340 bed AMA and ACS approved hospital. Department headed by physician anesthetist. Rooms available in nurses residence. Mount Sinai Hospital, 2750 W. 15th Place, Chicago 8, Ill.

NURSE ANESTHETIST: Member A.A.N.A. for 125 bed general hospital to expand department to include school of anesthesia. Must be willing to teach and supervise. Three anesthetists now employed. Desirable working conditions. $300 per month plus complete maintenance. City population 35,000; twenty miles south of state capital. Apply: Mr. K. S. Meredith, Assistant Administrator, Petersburg Hospital, Inc., Petersburg, Va.

TWO NURSE ANESTHETISTS: 150 bed hospital; $300 per month and full maintenance. Department directed by medical anesthetist. State experience. Apply to: Director of Anesthesia, St. Francis Sanitarium, Monroe, La.

WANTED: Nurse anesthetist, member A.A.N.A. 155 bed hospital. Salary range $300 to $350 per month. Write: Sister Administrator, Sacred Heart Hospital, Pensacola, Fla.

TWO NURSE ANESTHETISTS: South. 200 bed general hospital. Attractive salary and pleasant working conditions. Maintenance furnished if desired or allowance for living out. Apply: Box B-20, Journal A.A.N.A., 116 S. Michigan Ave., Chicago 3, Ill.

WANTED: Nurse anesthetist for 252 bed Catholic hospital. Good personnel policies; congenial working conditions; no delivery room calls. Beginning salary $3600 per year for well qualified anesthetist. Write: Director, Columbus Hospital, Great Falls, Mont.

ANESTHETIST: Large general hospital. Forty hour week with paid overtime. Liberal vacation. Quarters available if desired. Near Wayne University. Apply: Director Anesthesia, The Harper Hospital, Detroit 1, Mich.

WANTED: Nurse anesthetist, for 165 bed hospital with an active surgical and anesthesia service. Three nurse anesthetists at present; wish to add a fourth. Salary open; maintenance optional. Write to: Hal Perrin, Administrator, Bishop Clarkson Memorial Hospital, Omaha, Neb.

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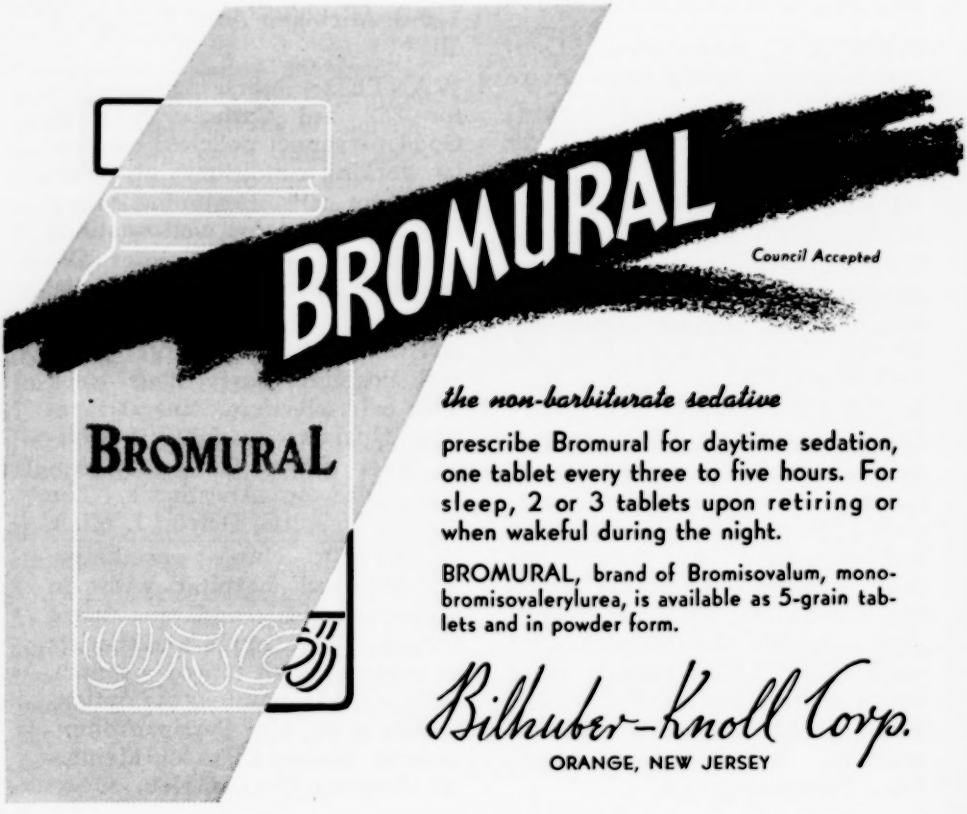

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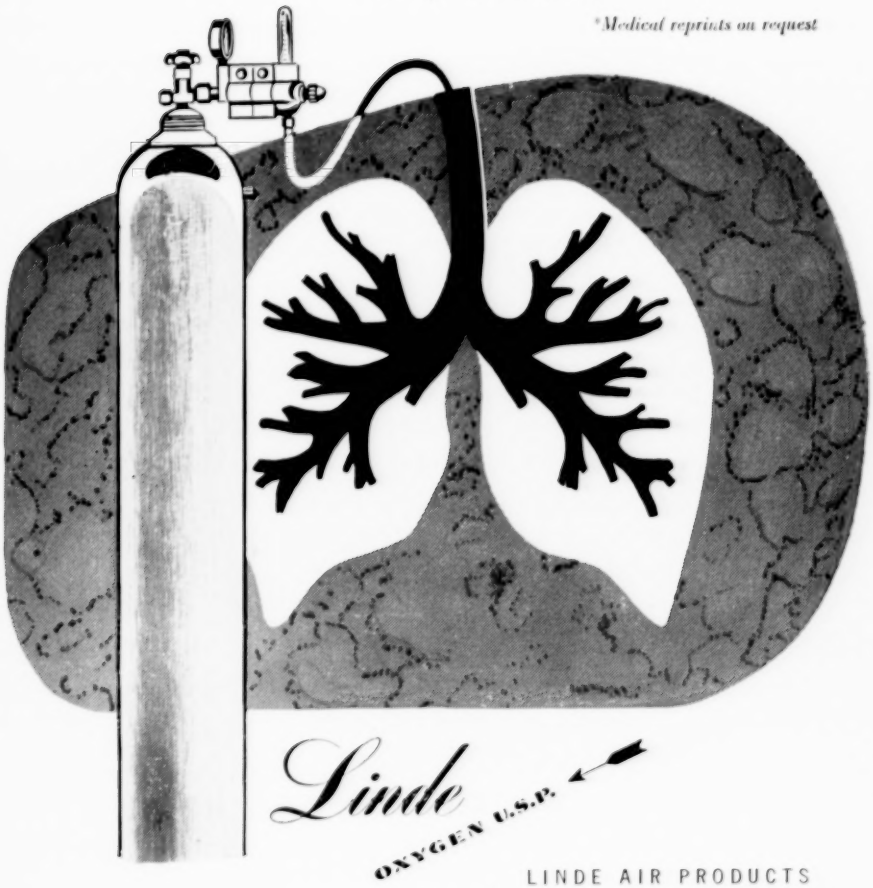

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